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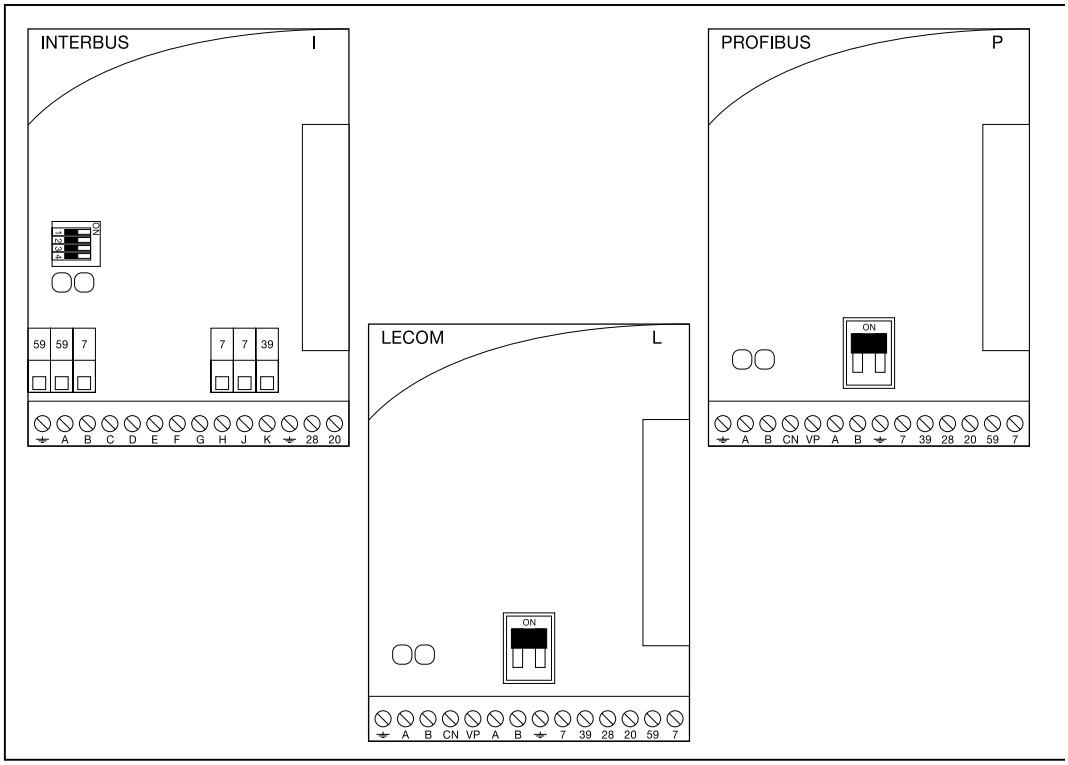
Lenze

Operating Instructions

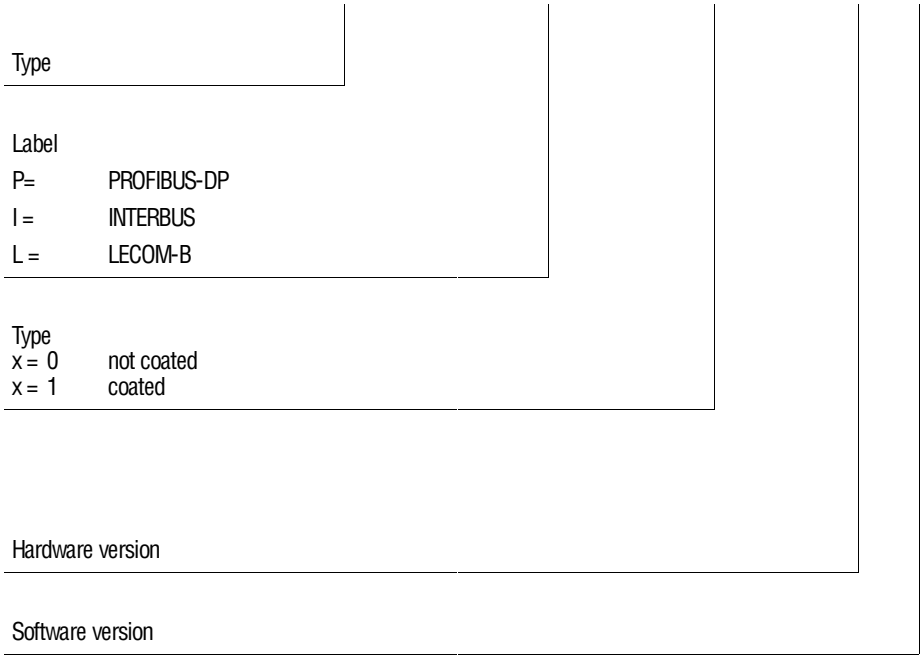


Global Drive

Fieldbus function modules for frequency inverters
8200 motec/8200 vector

This documentation is valid for fieldbus modules as from the version

E82AFP	000	P	0	B00x	XX	0x	0x	PROFIBUS-DP
E82AFI	000	I	0	B00x	XX	0x	0x	INTERBUS
E82AFL	000	CCW	0	B00x	XX	0x	0x	LECOM-B (RS485)



These Instructions are valid only together with the Operating Instructions of the 8200 motec or 8200 vector controllers.

Version 1.0 07/99

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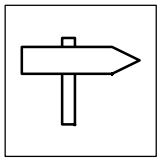

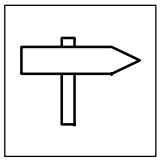

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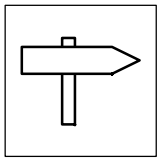
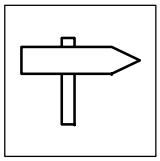




Contents

1 Preface and general information

1.1 The function modules PROFIBUS-DP, INTERBUS and LECOM-B (RS485)

Thanks to the growing rate of automation in mechanical engineering, fieldbusses are increasingly used.

Different fieldbus function modules are available to implement the 8200 vector and 8200 motec frequency inverters into machines and systems with fieldbusses. The modular design allows the use frequency inverters to different fieldbus systems, depending on the master system or the process. The simple plugging of the function module makes the frequency inverter a complete fieldbus device.

This concept represents a further step towards flexible automation.

1.2 About these Operating Instructions

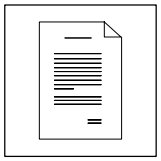
- These Operating Instructions are intended for all persons who install, set-up and adjust the function modules PROFIBUS-DP, INTERBUS and LECOM-B (RS485).
- These Instructions are meant as an addition to the Mounting Instructions which are part of the function modules PROFIBUS-DP, INTERBUS and LECOM-B (RS485).
  – The features and funtions are described in detail.
  – The settings for the configuration are described in detail.

1.2.1 Terminology used

Term	In the following text used for
Controller	Any frequency inverter, servo inverter or DC controller
8200 motec	Frequency inverter 8200 motec
8200 vector	Frequency inverter 8200 vector
Drive	8200 motec or 8200 vector frequency inverters in combination with a geared motor, a three-phase AC motor and other Lenze drive components
Fieldbus function modules	Any fieldbus function module (PROFIBUS-DP, INTERBUS, LECOM-B)
AIF	**A**utomation**I**nter**F** ace: Interface for a communication module.
FIF	**F** unction**I**nter**F** ace: Interface for a function module.
Cxxxx/y	Subcode y of code Cxxxx (e.g. C0410/3 = subcode 3 of code C0410)
Xk/y	Terminal y on terminal strip Xk (e. g. X3/28 = terminal 28 on terminal strip X3)
🕮 xx-yyy	Cross reference

1.2.2 What is new?

Version	Id No.	Changes
1.0 07/99	00409223	First edition



1.3 Legal regulations

Labelling	**Nameplate**	**CE mark**	**Manufacturer**
	Lenze function modules are unambiguously identified by their nameplates.	Conforms to the EC Low Voltage Directive	Lenze GmbH & Co KG Postfach 101352 D-31763 Hameln
Application as directed	**Function modules PROFIBUS, INTERBUS and LECOM-B (RS485)** ● must only be operated under the conditions prescribed in these Operating Instructions. ● are accessory modules for the 8200 motec and 8200 vector frequency invertes which are plugged on the ”function interface (FIF)”. ● connect the 8200 motec and 8200 vector frequency inverters to the fast communication systems PROFIBUS-DP (PROFIBUS function module) or INTERBUS (INTERBUS function module) or to the fast communication system LECOM-B from Lenze (LECOM-B function module). ● are components together with the 8200 motec and 8200 vector frequency inverters – for open and closed loop control of variable speed drives with asynchronous standard motors, reluctance motors, PM synchronous motors with asynchronous damping cage. – for installation into a machine – used for assembly together with other components to form a machine. ● comply, together with frequency inverters, to the requirements of the EC Low-Voltage Directive. ● are, together with frequency inverters, not machines for the purpose of the EC Machinery Directive. ● are not to be used as domestic appliances, but only for industrial purposes. **Drives with 8200 motec, 8200 vector frequency inverters and the function modules PROFIBUS, INTERBUS or LECOM-B** ● meet the EC Electromagnetic Compatibility Directive if they are installed according to the guidelines of CE-typical drive systems. ● can be used – for operation at public and non-public mains – for operation in industrial premises and residential areas. ● The user is responsible for the compliance of his application with the EC directives. **Any other use shall be deemed inappropriate!**		
Liability	● The information, data, and notes in these instructions met the state of the art at the time of printing. Claims referring to drive systems which have already been supplied cannot be derived from the information, illustrations, and descriptions given in these Operating Instructions. ● The specifications, processes, and circuitry described in these Operating Instructions are for guidance only and must be adapted to your own specific application. Lenze does not take responsibility for the suitability of the process and circuit proposals. ● The indications given in these Operating Instructions describe the features of the product without warranting them. ● Lenze does not accept any liability for damage and operating interference caused by: – Disregarding these Operating Instructions – Unauthorized modifications to the controller – Operating errors – Improper working on and with the controller		
Warranty	● Warranty conditions: see Sales and Delivery Conditions of Lenze GmbH & Co KG. ● Warranty claims must be made immediately after detecting defects or faults. ● The warranty is void in all cases where liability claims cannot be made.		
Disposal	**Material**	**recycle**	**dispose**
	Metal	●	-
	Plastic	●	-
	Printed-board assemblies	-	●

2 Safety information

2.1 Safety and application notes for Lenze controllers

(according to: Low-Voltage Directive 73/23/EC)

1. General

During operation, drive controllers may have live, bare, in some cases also movable or rotating parts as well as hot surfaces, depending on their level of protection.

Non-authorized removal of the required cover, inappropriate use, incorrect installation or operation, creates the risk of severe injury to persons or damage to material assets.

Further information can be obtained from the documentation.

All operations concerning transport, installation, and commissioning as well as maintenance must be carried out by qualified, skilled personnel (IEC 364 and CENELEC HD 384 or DIN VDE 0100 and IEC report 664 or DIN VDE 0110 and national regulations for the prevention of accidents must be observed).

According to this basic safety information qualified skilled personnel are persons who are familiar with the erection, assembly, commissioning, and operation of the product and who have the qualifications necessary for their occupation.

2. Application as directed

Drive controllers are components which are designed for installation in electrical systems or machinery.

When installing in machines, commissioning of the drive controllers (i.e. the starting of operation as directed) is prohibited until it is proven that the machine corresponds to the regulations of the EC Directive 89/392/EEC (Machinery Directive); EN 60204 must be observed.

Commissioning (i.e. starting of operation as directed) is only allowed when there is compliance with the EMC Directive (89/336/EEC).

The drive controllers meet the requirements of the Low Voltage Directive 73/23/EEC. The harmonized standards of the series Reihe EN 50178 /VDE 0160) together with EN 60439-1 /DIN VDE 0660 part 500 and EN 60146 /DIN VDE 0558 apply to the controllers

The technical data and information on the connection conditions must be obtained from the nameplate and the documentation and must be observed in all cases.

3. Transport, storage

Notes on transport, storage and appropriate handling must be observed.

The climatic conditions must be maintained as prescribed in EN 50178.

4. Erection

The devices must be erected and cooled according to the regulations of the corresponding documentation.

The drive controllers must be protected from inappropriate loads. Particularly during transport and handling, components must not be bent and/or isolating distances must not be changed. Touching of electronic components and contacts must be avoided.

Drive controllers contain electrostatically sensitive components which can easily be damaged by inappropriate handling. Electrical components must not be damaged or destroyed mechanically (health risks are possible!).

5. Electrical connection

When working on live drive controllers, the valid national regulations for the prevention of accidents (e.g. VBG 4) must be observed.

The electrical installation must be carried out according to the appropriate regulations (e.g. cable cross-sections, fuses, PE connection). More detailed information is included in the documentation.

Notes concerning the installation in compliance with EMC - such as screening, grounding, arrangement of filters and laying of cables - are included in the documentation of the drive controllers. These notes must also be observed in all cases for drive controllers with the CE mark. The compliance with the required limit values demanded by the EMC legislation is the responsibility of the manufacturer of the system or machine.

6. Operation

Systems where drive controllers are installed must be equipped, if necessary, with additional monitoring and protective devices according to the valid safety regulations, e.g. law on technical tools, regulations for the prevention of accidents, etc. Modifications of the drive controllers by the operating software are allowed.

After disconnecting the drive controllers from the supply voltage, live parts of the controller and power connections must not be touched immediately, because of possibly charged capacitors. For this, observe the corresponding labels on the drive controllers.

During operation, all covers and doors must be closed.

7. Maintenance and servicing

The manufacturer's documentation must be observed.

This safety information must be kept!
The product-specific safety and application notes in these Operating Instructions must also be observed!

2.2 Residual hazards

Protection of persons	• Before working on the controller, check that no voltage is applied to the power terminals and the relay output, – because the power terminals U, V, W and BR0, BR1, BR2 remain live for at least 1 second after mains switch-off. – because the power terminals L1, L2, L3; U, V, W und BR0, BR1, BR2 remain live when the motor is stopped. – because the relay outputs K11, K12, K14 remain live when the controller is separated from the mains. • For the use of the function “Selection of direction of rotation” (C0007, C0410): – The drive can reverse the direction of rotation in the event of a control-voltage failure or a cable break. • If you use the function ”Flying-restart circuit” (C0142 = -2-, -3-) with machines with a low moment of inertia and a minimum friction: – The motor can start for a short time or reverse the direction of rotation for a short time after enabling the controller when the motor is at standstill. • The heat sink of the controller has an operating temperature of >60 °C: – Direct skin contact results in burnings.
Controller protection	• **Cyclic** connection and disconnection of the controller supply voltage with L1, L2, L3 can exceed the input current limit: – Allow at least 1 second between disconnection and reconnection. • Depending on the controller settings, the connected motor can be overheated: – For instance, longer DC-braking operations. – Longer operation of self-ventilated motors at low speed.
Overspeeds	• Drives can reach dangerous overspeeds (e.g. setting of inappropriately high field frequencies): – The controllers do not offer any protection against these operating conditions. For this, use additional components.

2.3 Layout of the safety information

All safety information given in these Operating Instructions has the same layout:

Signal word (characterizes the severity of danger)

Note (describes the danger and gives information how to avoid it)

	Icons used		Signal words	
Warning of damage to persons		Warning of hazardous electrical voltage	**Danger!**	Warns of **impending danger**. Consequences if disregarded: Death or severe injuries.
		Warning of a general danger	**Warning!**	Warns of **potential, very hazardous situations**. Possible consequences if disregarded: Death or severe injuries.
			Caution!	Warns of **potential, hazardous situations**. Possible consequences if disregarded: Light or minor injuries.
Warning of damage to material			**Stop!**	Warns of **potential damage to material**. Possible consequences if disregarded: Damage of the controller/drive system or its environment**.**
Other notes			**Tip!**	Designates a general, useful note. If you observe it, handling of the controller/drive system is made easier.

3 Function module PROFIBUS-DP

3.1 Description

The function module PROFIBUS-DP is a component for the frequency inverters 8200 motec and 8200 vector, which connects the controllers to the serial, standardized communication system PROFIBUS-DP.

The controllers can also be retrofitted.

3.2 Technical data

Communication medium	RS485
Communication profile	PROFIBUS-DP (DIN 19245 part 1 and part 3)
Drive profile	DRIVECOM profile “Power transmission 20”
Baud rate [kBit/s]	9.6 ... 12000 (automatic recognition)
PROFIBUS-DP device	Slave
Network topology	without repeater: line with repeater: line or tree
Process data words (PCD) (16 bit)	1 word ... 10 words
DP user-data length	Parameter channel (4 words) + Process data words
number of devices	Standard: 32 (= 1 bus segment) with repeaters: 125
max. cable length per bus segment	1000 m (depending on the baud rate and cable type used)
Communication time	• Total of cycle time and the processing time in the fieldbus devices. The times are independent of each other. • Processing time in the controller: – Parameter data and process data are indpendent of each other. – Parameter data: approx. 30 ms + 20 ms tolerance – Process data: approx. 3 ms + 2 ms tolerance
Electrical connection	Screw terminals Terminal for controller inhibit (CINH) available
DC supply voltage	• Internal • External, necessary – for bus devices which are disconnected from the mains, but their communication to the mains is to be maintained. – for bus devices with activated bus terminating resistor which are disconnected from the mains, but the bus system is to remain active. – Supply via separate switch mode power supply – +24 V DC ±10 %, max. 80 mA
Insulation voltage to PE	50 V AC
Type of protection	IP20
Ambient temperature	during operation: -10 ... +60 °C Transport: -25 ... +60 °C Storage: -25 ... +60 °C
Climatic conditions	Class 3K3 to EN 50178 (without condensation, average relative humidity 85 %)
Dimensions (L x W x H)	65 mm x 50 mm x 23 mm

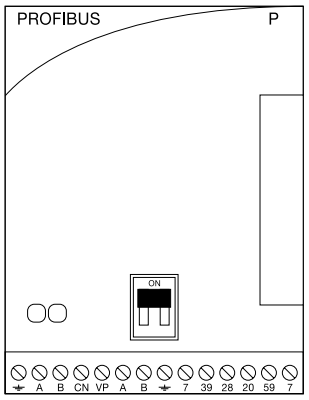
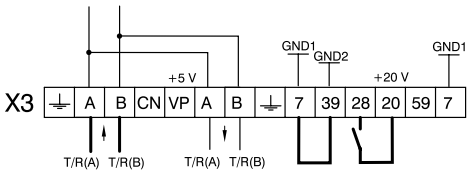
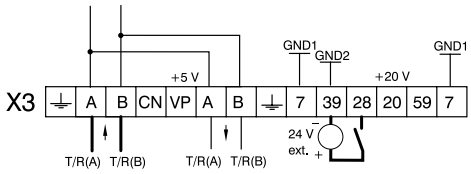
3.3 Installation

3.3.1 Mechanical installation

See Instructions of the function module

3.3.2 Electrical installation

3.3.2.1 Terminal assignment

Front view	Supply of terminal "Controller inhibit (CINH)" via internal voltage source X3/20 (+20 V DC)	Supply of terminal "Controller inhibit (CINH)" via external voltage source + 24 V DC (+12 V DC - 0 % ... +30 V DC + 0 %)
		
	The min. wiring requirements for operation	

X3/	Input (I) / output (O)	Explanation	
59	I	External DC supply, reference X3/7	Cable diameter: max. 1 mm² (AWG18) Tightening torque: 0.5 ... 0.6 Nm (4.4 ... 5.3 lbin)
7	-	GND1, reference potential 1	
39	-	GND2, reference potential for X3/28 (CINH)	
⊥	-	PES, additional HF screen connection	
0	I/O	T/R(A), RS485 data line A	
B	I/O	T/R(B), RS485 data line B	
CN	O	CNTR, CNTR = HIGH (+5 V) during data transmission	
VP	O	+5 V (10 mA load)	
28	I	Controller inhibit (CINH) • Start = HIGH (+12 V ... +30 V) • Stop = LOW (0 ... +3 V)	
20	O	+20 V internal for CINH, reference: X3/7	
DIP switch			
	DIP switch = ON	Integrated bus terminating resistor active	
	DIP switch = OFF	Integrated bus terminating resistor inactive	

Fig. 3-1 Terminal assignment of the function module PROFIBUS-DP

Note!

The bus system must be terminated at the physically first and last bus device (master or slave)!

3.3.2.2 Wiring with a host (PC or PLC)

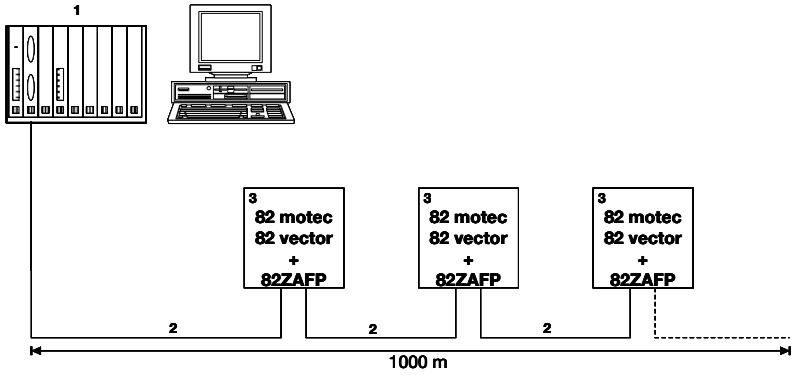
Basic structure	Specification bus cable	
	Cable resistance	135 - 165 Ω/km (f = 3 - 20 MHz)
	Capacitance per unit length	≤ 30 nF/km
	Loop resistance	< 110 Ω/km
	Wire diameter	> 0.64 mm
	Wire cross-section	0.34 mm^2
	Wires	twisted pair, insulated and screened

Fig. 3-2 Basic structure of a PROFIBUS-DP network with RS485 cabling without repeater

Elements of the PROFIBUS-DP network						
No.	**Element**	**Note**				
1	Host	e.g. PC or PLC with PROFIBUS-DP master interface module				
2	Bus cable	**Baud rate [kbit/s]**	**9.6 - 187.5**	**500**	**1500**	**12000**
		max. length [m]	1000	400	200	100
3	PROFIBUS-DP slave	Lenze controller with function module PROFIBUS-DP (82ZAFP)				

Note!

- The controller has a double basic insulation to VDE 0160. An additional mains insulation is not required.

3.4 Commissioning of function module

STOP

Stop!

- Prior to connecting the mains voltage, check
  – the entire wiring for completeness, earth fault and short circuit.
  – whether the bus system is terminated at the physically first and last bus device.
- **Keep to the switch-on sequence!**

3.4.1 Initial switch-on

Step	Lenze setting	Note
1. Configure master system for the communication with the function module PROFIBUS-DP.		📖 3-6
2. For the first and last bus device only: – DIP switch = ON (📖 3-2)	OFF	Activate bus terminating resistor.
3. Connect mains voltage of the controller and, if necessary, the external supply of the function module.		The green LED on the function module is illuminated (visible only on 8200 vector).
4. Assign a station address to every bus device under C1509.	3	Every bus device has another address. (📖 3-6)
5. You can communicate now with the controller.		The yellow LED is flashing when the PROFIBUS-DP is active.
6. If necessary, adapt the codes to your application.		See Operating Instructions of the controller
7. Select fieldbus function module as source for control commands and setpoints: C0005 = 200.		Necessary setting to communicate with the controllers via fieldbus.
8. Assign process output words (POW) of the master via C1511 to the process input words of the controller. (📖 3-13)	POW1: DRIVECOM control word (DRIVECOM CTRL) POW2: Setpoint1 (NSET1-N1) POW3: Setpoint2 (NSET1-N2) POW4: Additional setpoint (PCTRL1-NADD) POW5: Act. process controller value (PCTRL1-ACT) POW6: Process controller setpoint (PCTRL1-SET1) POW7: reserved (FIF-RESERVED) POW8: Torque setpoint or torque limit value (MCTRL1-MSET) POW9: PWM voltage (MCTRL1-VOLT-ADD) POW10: PWM phase (MCTRL1-PHI-ADD)	
9. Assign process output words of the controller to the process input words (PIW) of the master via C1510. (📖 3-17)	PIW1: DRIVECOM status word (DRIVECOM STAT) PIW2: Output frequency with slip (MCTRL1-NOUT+SLIP) PIW3: Output frequency without slip (MCTRL1-NOUT) PIW4: Apparent motor current (MCTRL1-IMOT) PIW5: Act. process controller value (PCTRL1-ACT) PIW6: Process controller setpoint (PCTRL1-SET1) PIW7: Process controller output (PCTRL1-OUT) PIW8: Controller load (MCTRL1-MOUT) PIW9: DC-bus voltage (MCTRL1-DCVOLT) PIW10: Ramp function generator input (NSET1-RFG1-IN)	
10. Enable process output data: C1512 = 65535.		Only necessary when C1511 was changed.
11. Enable controller via terminal.		X3/28 = HIGH
12. Select the setpoint.		Master sends setpoint via selected POW.
13. Change to state "READY TO START":		Master sends DRIVECOM control word = 0000 0000 0111 1110_{bin} ($007E_{hex}$).
14. Controller is "READY TO START".		Master receives DRIVECOM status word = xxxx xxxx x01x $0001_{bin.}$
15. Change to state "OPERATION ENABLED".		Master sends DRIVECOM control word = 0000 0000 0111 1111_{bin} ($007F_{hex}$).
16. The drive is now running.		

3.4.2 Create complete DRIVECOM compatibility

The DRIVECOM profile 20 is a non-proprietary specification of important parameters and device performance. The DRIVECOM profile 20 descrives the device control. To achieve complete DRIVECOM compatibility, deactivate Lenze-specific functions.

Controller	Deactivate function		Drive performance with activated function
8200 motec	Automatic DC injection braking (Auto-DCB)	L-C0106 = 0, L-C2106 = 0, L-C4106 = 0, L-C6106 = 0	Holding time Auto-DCB ≠ 0: After the holding time has elapsed and at zero speed, the controller changes automatically from the state "OPERATION ENABLED" to state SWITCHED ON". If the actual value is higher than 0, it changes automatically to the state "OPERATION ENABLED".
8200 vector			

3.5 Set up PROFIBUS-DP communication

PROFIBUS-DP transmits two different types of data between the host and the controllers via different communication channels:

Data		Communication channel used
Parameters e.g. operating parameters, diagnostic information, motor data	In general, the transmission of parameters is not as time-critical as the transmision of process data.	**Parameter channel** • Enables the access to all Lenze codes. • Parameter changes are normally saved in the controller (observe C0003). • If the parameter channel is active, it assigns four words of the input and output process data (📖 3-9)
Process data e.g. setpoint and actual values	Data must be exchanged in the shortest possible time.Small amounts of data which are transmitted cyclically.	**Process-data channel** • You can control the controller using DRIVECOM process data (📖 3-21). The host has direct access to the process data. In the PLC, for instance, the data are directly assigned to the I/O area. • Process data are transmitted cyclically (constant exchange of momentary input and output data between host and controllers). • Process data are not saved in the controller.

3.5.1 Configure master system for the communication with the function module

3.5.1.1 Master settings

For the set-up of PROFIBUS-DP, the master needs the device description file LENZ00DA.GSD supplied on diskette.

Copy LENZ00DA.GSD to the corresponding directory of your set-up software (e.g. to the directory ”GSD” for the COM PROFIBUS software).

3.5.1.2 Addressing of the bus devices (station address)

To address the controllers in the PROFIBUS-DP network, each device gets an address. Every bus device must have another address.

The address can be set in two ways:

- Setting of the station address via keypad/PC:
  - – Set the address under C1509 in the controller.
  - – **Valid address range: 3 ▫ 126.**
- Setting of the station address by a master (master class 2 only):
  - – With this method only one PROFIBUS-DP device must be connected. This can be achieved by a special switch-on sequence.

3.5.1.3 Determine user data length

The PROFIBUS-DP user data length is determined during the DP initialization phase (configuration). You can configure up to 10 process data words. As an option, you can activate the parameter channel. If the parameter channel is active, it assigns four words of the input and output process data.

The user data length for the process input data and process output data are identical. They are selected in the set-up software for the PROFIBUS-DP system via label byte.

Possible user data lengths:													
1 ... 10 words process data Label 70_{hex} ... 79_{hex} (112 ... 121)							POW1/PIW1		...		POW10/PIW10		
							Byte 1	Byte 2	...	...	Byte 19	Byte 20	
Parameter channel + 1 ... 10 words process data label 73_{hex} (115), 70_{hex} ... 79_{hex} (112 ... 121)	Parameter channel												
	Word 1		...		Word 4		POW1/PIW1		...		POW10/PIW10		
	Byte 1	Byte 2	...	...	Byte 7	Byte 8	Byte 9	Byte 10	...	...	Byte 27	Byte 28	

General structure of the label byte

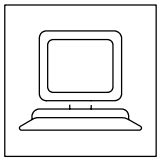
MSB							LSB
7	6	5	4	3	2	1	0

Data length
00 1 byte or 1 word
...
15 16 bytes or 16 words

Input/Output
00 Special label format
01 Input
10 Output
11 Input and output

Length/Format
0 Byte
1 Word

Consistency
0 Byte or word
1 Total length



Automation

PROFIBUS-DP

You will find the following configurations in the file LENZ00DA.GSD:

User data length	Selection text in LENZ00DA.GSD	Assigned I/O memory [Words]	Label byte 1 [dez]	Label byte 1 [hex]	Label byte 2 [dez]	Label byte 2 [hex]
With 4 words parameter channel without consistency	PAR + PCD (1 word I/O)	5	115	73	112	70
	PAR + PCD (2 words I/O)	6			113	71
	PAR + PCD (3 words I/O)	7			114	72
	PAR + PCD (4 words I/O)	8			115	73
	PAR + PCD (5 words I/O)	9			116	74
	PAR + PCD (6 words I/O)	10			117	75
	PAR + PCD (7 words I/O)	11			118	76
	PAR + PCD (8 words I/O)	12			119	77
	PAR + PCD (9 words I/O)	13			120	78
	PAR + PCD (10 words I/O)	14			121	79
With 4 words parameter channel with consistency	PAR (KONS) + PCD (1 word I/O)	5	243	F3	112	70
	PAR (KONS) + PCD (2 words I/O)	6			113	71
	PAR (KONS) + PCD (3 words I/O)	7			114	72
	PAR (KONS) + PCD (4 words I/O)	8			115	73
	PAR (KONS) + PCD (5 words I/O)	9			116	74
	PAR (KONS) + PCD (6 words I/O)	10			117	75
	PAR (KONS) + PCD (7 words I/O)	11			118	76
	PAR (KONS) + PCD (8 words I/O)	12			119	77
	PAR (KONS) + PCD (9 words I/O)	13			120	78
	PAR (KONS) + PCD (10 words I/O)	14			121	79
Without parameter channel	PCD (1 word I/O)	1	112	70	-	-
	PCD (2 words I/O)	2	113	71		
	PCD (3 words I/O)	3	114	72		
	PCD (4 words I/O)	4	115	73		
	PCD (5 words I/O)	5	116	74		
	PCD (6 words I/O)	6	117	75		
	PCD (7 words I/O)	7	118	76		
	PCD (8 words I/O)	8	119	77		
	PCD (9 words I/O)	9	120	78		
	PCD (10 words I/O)	10	121	79		

Tip!

Additional label byte

Apart from the configurations in the file LENZ00DA.GSD, the following label bytes are also valid:

- Parameter channel
  - 25_{dec}, 37_{hex} (8 bytes without consistency)
  - 183_{dec}, $B7_{hex}$ (8 bytes with consistency)
- Process data channel
  - 240_{dec} ... 249_{dec}, $F0_{hex}$ ... $F9_{hex}$ (with complete consistency)

Use complete consistency

- We recommend to use only configurations with consistency for the parameter channel to avoid data conflicts between PROFIBUS-DP master and the CPU of the master system.
- Please note that the different master systems process consistent data in a different way and consider this in the PROFIBUS-DP application program.
- Comprehensive description of the consistency: (📖 6-1)

3.5.2 Configure parameter channel

The PROFIBUS-DP parameter channel enables the access to all Lenze codes.

3.5.2.1 Structure of the parameter channel

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5[1)]	Byte 6[1)]	Byte 7[1)]	Byte 8[1)]
Service	**Subindex**	**Index High byte**	**Index Low byte**	**Data 4**	**Data 3**	**Data 2**	**Data 1**
				High Byte 1	Low Byte 1	High Byte 2	Low Byte 2
				High Word		Low Word	
				Double Word			
			In case of faulty transmission	**Error 4**	**Error 3**	**Error 2**	**Error 1**
				Error class	Error code	Additional Code High Byte	Additional Code Low Byte

1) Saving in the Motorola format: First the High Byte/High Word, then the Low Byte/Low Word.

Byte 1	**Service**	Job and response control for the DP parameter channel.	**Bit**	**Meaning**	
			2|1|0	Job/Service	Type of job to the controller The bits are set only by the master.
			000	no job	
			001	Read job	Read data from the controller
			010	Write job	Write data to the controller
			3	Reserved	
			5|4	Data length	Length of the data in the field data/error.
			00	1 Byte	
			01	2 Byte	
			11	4 Byte	
			6	Job/Handshake Indicates a new job.	Is changed by the master for every new job. The controller copies the bit to its response message.
			7	Job/Status	Status information from the controller to the master. Informs the master whether the job was carried out without faults.
			0	Job completed with fault.	
			1	Job not completed. A fault occured.	Data in the field Data/Error are interpreted as error message.
Byte 2	**Subindex**	Additional addressing to select subcodes.	For codes without subcodes, byte 2 must be zero, otherwise the job cannot be completed.		
Byte 3	**Index High Byte**	PROFIBUS-DP index of the desired Lenze code	PROFIBUS-DP index = 24575 - Lenze code number		
Byte 4	**Index Low Byte**				
Byte 5	**Data 4**	High Byte 1	Parameter value or fault information indicated with invalid access. Byte 1, Bit 7 "Job/Status" determines the meaning of the data field. • Data – Parameter value, which assigns 1 to 4 bytes depending on the data format. – Strings or data blocks cannot be transferred. • Error – Fault detection (for description see the following table).		
	Error 4	Error class			
Byte 6	**Data 3**	Low Byte 1			
	Error 3	Error code			
Byte 7	**Data 2**	High Byte 2			
	Error 2	Additional Code High Byte			
Byte 8	**Data 1**	Low Byte 2			
	Error 1	Additional Code Low Byte			

Fault messages in the error field (Data/Error)				
Byte 5	**Byte 6**	**Byte 7**	**Byte 8**	**Meaning**
Error class	**Error code**	**Additional code [hex]**		**Meaning**
0	0	00	00	No fault
6	3	00	00	No access permission
6	5	00	10	Inadmissible job parameter
6	5	00	11	Invalid subindex
6	5	00	12	Data too long
6	7	00	00	Object does not exist
6	8	00	00	Data types are not identical
8	0	00	21	Cannot be executed because of local control
8	0	00	22	Cannot be executed because of unit status
8	0	00	30	Leave value range
8	0	00	40	Collision with other values
8	0	00	20	Service cannot be executed currently

3.5.2.2 Access to Lenze parameters

Lenze parameters are addressed via Lenze codes. For Lenze parameters with the assigned value ranges, please refer to the code table of the controller.

<table>
<tr><th colspan="2"></th><th colspan="3">Addressing</th></tr>
<tr><td>Lenze codes</td><td>In this description, Lenze codes are identified by „L-Cxxxx“, to avoid confusion with the PROFIBUS-DP index (e.g. L-C0001 for Lenze Code C0001).</td><td colspan="3">• Addressing of Lenze codes via offset:
– PROFIBUS-DP index = 24575 - LENZE_CODENR
– PROFIBUS-DP index$_{hex}$ = 5FFF$_{hex}$ - LENZE_CODENR$_{hex}$
• Example for L-C0001 (operating mode):
– PROFIBUS-DP index = 24574 (= 24575 - 1)
– PROFIBUS-DP index$_{hex}$ = 5FFE$_{hex}$ (= 5FFF$_{hex}$ - 1$_{hex}$)</td></tr>
<tr><td>Lenze parameters</td><td>Lenze parameters primarily represented in the fixed-point format (data type Integer32) with four decimal codes.</td><td colspan="3">• Multiply desired parameter value with 10000.
• Example: Set L-C0039 (JOG) = 150.4 Hz:
– 150.4 x 10000 = 1504000$_{dec}$ (0016F300$_{hex}$)</td></tr>
<tr><td rowspan="5">Lenze parameter sets</td><td rowspan="5">The four parameter sets can be addressed directly with PROFIBUS-DP via code offsets:
Use offset 0 for parameters which occur only once!
(Marked with “*”in the code tables.)</td><td>Offset</td><td>Parameter set</td><td>Example:
Address of C0011</td></tr>
<tr><td>0</td><td>1</td><td>11</td></tr>
<tr><td>2000</td><td>2</td><td>2011</td></tr>
<tr><td>4000</td><td>3</td><td>4011</td></tr>
<tr><td>6000</td><td>4</td><td>6011</td></tr>
</table>

3.5.2.3 Read job to the controller

	Example	
	Read heatsink temperature C0061 (= 43 °C) from controller.	
1. Determine the user data range of the controller: i. e. determine the location of the DP user data in the host.		
2. Enter address of the desired parameter in the field "Index and subindex".	Byte 2 = 0 Byte 3 = $5F_{hex}$ Byte 4 = $C2_{hex}$	Subindex = 0, because C0061 has no subcode. Index = 24575 - Code no. Index = 24575 - 61 = 24514 = $5FC2_{hex}$
3. Specify job	Byte 1 = 0xxx 0001	Bit 0-2 = 001 (1 = Read job) Change bit 6 "Job/Handshake"
4. Check, whether the bit "job/handshake" is the same for the DP input data and the DP output data. If the bit "job/handshake" is the same, the response has been received. It is useful to monitor the communication time.		
5. Check whether the bit "Job/Status" is set. – Not set = the field "Data/Error" contains the desired parameter value. – Set = Read job not completed successfully, the field "Data/Error" contains error information.	Byte 5 = 00 Byte 6 = 06_{hex} Byte 7 = $8F_{hex}$ Byte 8 = $B0_{hex}$	00 06 8F $B0_{hex}$ = 430000_{dec} 430000/10000 = 43 (43 °C heat sink temperature)

Response to drive

Byte 1	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**	**Byte 8**
Service	Subindex	Index High byte	Index Low byte	Data 4	Data 3	Data 2	Data 1
0xxx 0001	0	5F	C2	00	00	00	00

Response of the drive when completed successfully

Byte 1	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**	**Byte 8**
Service	Subindex	Index High byte	Index Low byte	Data 4	Data 3	Data 2	Data 1
0x11 000x	0	5F	C2	00	06	8F	B0

3.5.2.4 Write job to the controller

	Example	
	Change acceleration time C0012 of the controller to 20 s.	
1. Determine the user data range of the controller: i. e. determine the location of the DP user data in the host.		
2. Enter address of the desired parameter in the field "Index and subindex".	Byte 2 = 0 Byte 3 = 5F Byte 4 = F3	Subindex = 0, because C0012 has no subcode. Index = 24575 - Code no. Index = 24575 - 12 = 24563 = $5FF3_{hex}$
3. Calculate data value and enter.	Byte 5 = 00 Byte 6 = 03 Byte 7 = 0D Byte 8 = 40	20 s x 10000 = 200000_{dec} = 00 03 0D 40_{hex}
4. Specify job	Byte 1 = 0x11 0010	Bit 0-2 = 010 (1 = Write job) Bit 4-5 = 11 (4 Byte data) Change Bit 6 "Job/Handshake"
5. Check, whether the bit "job/handshake" is the same for the DP input data and the DP output data. If the bit "job/handshake" is the same, the response has been received. It is useful to monitor the communication time.		
6. Check whether the bit "Job/Status" is set. – Not set = Write job completed without fault. – Set = Write job not completed successfully, the field "Data/Error" contains error information.		

Response to drive

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Service	Subindex	Index High byte	Index Low byte	Data 4	Data 3	Data 2	Data 1
0x11 0010	0	5F	F3	00	03	0D	40

Response of the drive when completed successfully

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Service	Subindex	Index High byte	Index Low byte	Data 4	Data 3	Data 2	Data 1
0xxx 00x0	0	5F	F3	00	00	00	00

3.5.3 Configure process data channel

Assign the max. 10 process data words of PROFIBUS-DP to the process data words of the controller via the free configuration of the process data. Make the assignments in codes C1511 (process output data) and C1510 (process input data).

From the position of the master:

- The master sends process output data in max. 10 process data output words (POW) to the bus device.
- The master receives process input data in max. 10 process data input words (PIW) from the bus device.

3.5.3.1 Configure process output data

Code		Possible settings			IMPORTANT	
No.	Name	Lenze	Selection		Standardization	Parameter channel
C1511	Configuration process output data master				Assigns process data output words of the master to bit control commands or setpoints of the controller. **Modification of C1511 automatically inhibits process output data to ensure data consistency.** Enable again under C1512.	
1	POW1	17	1	FIF control word 1 (FIF-CTRL1)	16 Bit	-
2	POW2	3	2	FIF control word 2 (FIF-CTRL2)	16 Bit	-
3	POW3	4	3	Setpoint 1 (NSET1-N1)	±24000 ≡ ±480 Hz	C0046
4	POW4	5	4	Setpoint 2 (NSET1-N2)	±24000 ≡ ±480 Hz	C0044
5	POW5	6	5	Additional setpoint (PCTRL1-NADD)	±24000 ≡ ±480 Hz	C0049
6	POW6	7	6	Act. process controller value (PCTRL1-ACT)	±24000 ≡ ±480 Hz	C0051 when C0238 = 1, 2
7	POW7	8	7	Process controller setpoint (PCTRL1-SET1)	±24000 ≡ ±480 Hz	C0138
8	POW8	9	8	Reserved		
9	POW9	10	9	Torque setpoint or torque limit value (MCTRL1-MSET)	2^{14} ≡ 100 % rated motor torque	C0047
10	POW10	11	10	PWM voltage (MCTRL1-VOLT-ADD)	**Only for special applications. Modifications only when agreed on by Lenze!**	
			11	PWM phase (MCTRL1-PHI-ADD)		
			12	Reserved		
			13	FIF-IN.W1	16 bit or 0 ... 65535	
			14	FIF-IN.W2	16 bit or 0 ... 65535	
			15	FIF-IN.W3	0 ... 65535	
			16	FIF-IN.W4	0 ... 65535	
			17	DRIVECOM control word (DRIVECOM-CTRL)	16 bit	
C1512	Enable process output data		0 {1} 65535 65535 = enable all		The decimal value of the bit settings enables any combinations of the process output words. • 0 = Inhibit output word • 1 = Enable output word	
			POW10 POW9 ... POW3 POW2 POW1 2^9 2^8 ... 2^2 2^1 2^0			

The assignment of the max. 10 process data output words (POW) of the master can be freely configured to bit control commands or setpoints:

- To activate the DRIVECOM control, assign the DRIVECOM control word (C1511/x = 17) to a POW.
  - – The DRIVECOM control word is mapped to the FIF control word 1.
  - – The controller complies with the DRIVECOM status machine (📖 3-21).
- Use the FIF control words to set up an extended device control. (📖 3-16).
- The process output data are inhibited automatically when C1511 is modified to ensure data consistency. Under C1512, you can enable individual or all POWs.

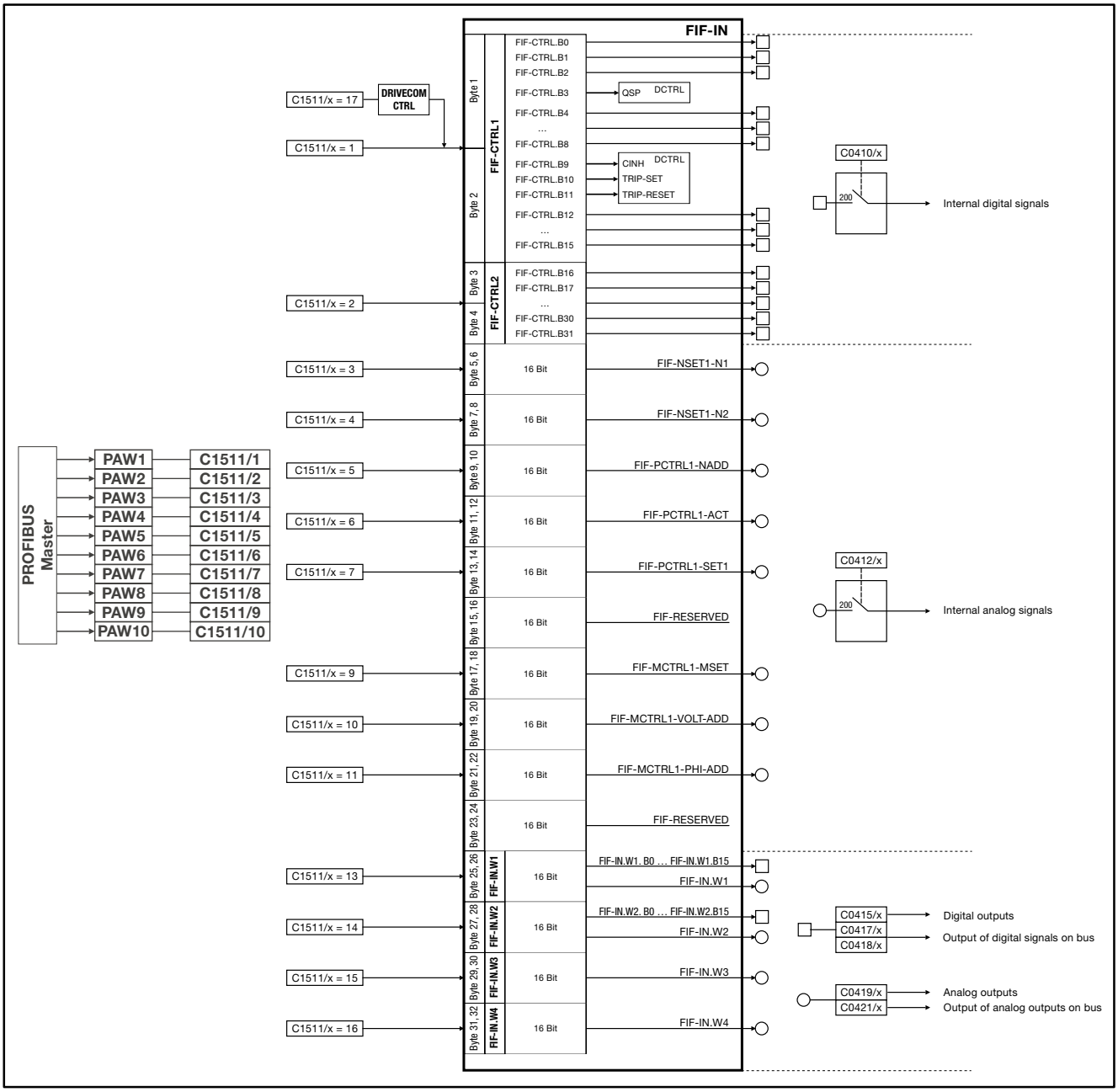
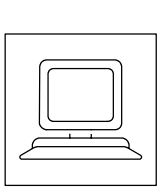


Fig. 3-3 Free configuration of the 10 process output words of the PROFIBUS-DP



Structure of the parameter "DRIVECOM control word" (DRIVECOM-CTRL):

Bit	Meaning
0	**Command "Switch on"**
0	Command "Stop" active
1	Command "Switch on" active
1	**Command "Inhibit voltage"**
0	Command "Inhibit voltage" active
1	Command "Inhibit voltage" not active
2	**Command "Quick stop"**
0	Command "Quick stop" activated
1	Command "Quick stop" not active
3	**Command "Enable operation"**
0	Command "Inhibit operation" active
1	Command "Enable operation" active
4	**Command "Inhibit ramp generator"** Inhibit the ramp generator (NSET1-RFG1). The quick stop function is released; the drive remains in its status. Mapping to FIF control word 1 (FIF-CTRL1), bit 3 negated (FIF-CTRL1-QSP)
0	Inhibit ramp generator active
1	Inhibit ramp generator not activated
5	**Command "Stop ramp generator"** Output of the ramp generator (NSET1-RFG1) is "frozen"; the drive remains in its status. Mapping to FIF control word 1 (FIF-CTRL1), bit 4 negated (NSET1-RFG1-STOP)
0	0 = RFG stop
1	1 = RFG stop not active
6	**Command "Ramp generator zero"** Set input of ramp generator (NSET1-RFG1) to zero. ⇒ Controlled deceleration along the ramp set under C0013; the drive remains in its state. Mapping to FIF control word 1 (FIF-CTRL1), bit 5 negated (NSET1-RFG1-0)
0	0 = RFG zero
1	1 = RFG zero not active
7	**TRIP reset** Fault reset (TRIP).
0 ⇒ 1	Bit change causes TRIP reset
8	DRIVECOM reserved
9	DRIVECOM reserved
10	DRIVECOM reserved
11	Mapping to FIF control word 1 (FIF-CTRL1), bit 10 (FIF-CTRL1-TRIP-SET)
12	Mapping to FIF control word 1 (FIF-CTRL1), bit 12 (DCTRL1-PAR2/4)
13	Mapping to FIF control word 1 (FIF-CTRL1), bit 13 (DCTRL1-PAR-3/4)
14	Mapping to FIF control word 1 (FIF-CTRL1), bit 14 (MCTRL1-DCB)
15	Not assigned

Structure of parameter FIF control word (FIF-CTRLx)

FIF control word 1 (FIF-CTRL1)		FIF control word 2 (FIF-CTRL2)	
Bit	**Assignment**	**Bit**	**Assignment**
1|0	**JOG values (NSET1-JOG2/3 | NSET1-JOG1/3)** 00 C0046 active 01 JOG1 (C0037) active 10 JOG2 (C0038) active 11 JOG3 (C0039) active	**0**	**Manual/Remote change-over (DCTRL1-H/Re)** 0 not active 1 active
		1	**Switch-off the integral action component of the process controller (PCTRL1-I-OFF)** 0 not active 1 active
2	**Actual direction of rotation (DCTRL1-CW/CCW)** 0 not inverted 1 inverted	**2**	**Switch-off the process controller (PCTRL1-OFF)** 0 not active 1 active
3	**Quick stop (FIF-CTRL1-QSP)** 0 not active 1 active (deceleration along QSP ramp C0105)	**3**	Reserved
4	**Stop ramp function generator (NSET1-RFG1-STOP)** 0 not active 1 active	**4**	**Stop the process controller (PCTRL1-STOP)** 0 not active 1 active
5	**Ramp function generator input = 0 (NSET1-RFG1-0)** 0 not active 1 active (deceleration to C0013)	**5**	**CW rotation/quick stop (DCTRL1-CW/QSP)** 0 not active 1 active
6	**UP function of motor potentiometer (MPOT1-UP)** 0 not active 1 active	**6**	**CCW rotation/quick stop (DCTRL1-CCW/QSP)** 0 not active 1 active
7	**DOWN function of motor potentiometer (MPOT1-DOWN)** 0 not active 1 active	**7**	**X3/E1 is digital frequency input (DFIN1-ON)** 0 not active 1 active
8	Reserved	**8**	Reserved
9	**Controller inhibit (FIF-CTRL1-CINH)** 0 Controller enabled 1 Controller inhibited	**9**	Reserved
10	**External fault (FIF-CTRL1-TRIP-SET)**	**10**	Reserved
11	**Fault reset (FIF-CTRL1-TRIP-RESET)** 0 ⇒ 1 Bit change causes TRIP reset	**11**	Reserved
13|12	**Parameter set changeover (DCTRL1-PAR3/4 | DCTRL1-PAR2/4)** 00 PAR1 01 PAR2 10 PAR3 11 PAR4	**12**	Reserved
		13	Reserved
14	**DC injection brake (MTCRL1-DCB)** 0 not active 1 active	**14**	Reserved
15	Reserved	**15**	Reserved

3.5.3.2 Configure process input data

Code		Possible settings			IMPORTANT	
No.	Name	Lenze	Selection		Standardisation	Parameter channel
C1510	Configuration process input data master				Assigns status information or actual values of the controller to the process data input words of the master.	
1	PIW1	18	1	FIF control word 1 (FIF-STAT1)	16 Bit	-
2	PIW2	3	2	FIF status word 2 (FIF-STAT2)	16 Bit	-
3	PIW3	4	3	Output frequency with slip (MCTRL1-NOUT+SLIP)	±24000 ≡ ±480 Hz	C0051 when C0238 = 2
4	PIW4	5	4	Output frequency without slip (MCTRL1-NOUT)	±24000 ≡ ±480 Hz	C0050
5	PIW5	6	5	Apparent motor current (MCTRL1-IMOT)	2^{14} ≡ 100 % rated controller current	C0054
6	PIW6	7	6	Act. process controller value (PCTRL1-ACT)	±24000 ≡ ±480 Hz	C0051 when C0238 = 0, 1
7	PIW7	8	7	Process controller setpoint (PCTRL1-SET)	±24000 ≡ ±480 Hz	
8	PIW8	9	8	Process controller output (PCTRL1-OUT)	±24000 ≡ ±480 Hz	
9	PIW9	10	9	Controller load (MCTRL1-MOUT)	$\pm 2^{14}$ ≡ ±100 % rated motor torque	
10	PIW10	11	10	DC-bus voltage (MCTRL1-DCVOLT)	1ph: 960 ≡ DC 400 V 3ph: 975 ≡ DC 800 V	C0053
			11	Ramp function generator input (NSET1-RFG1-IN)	±24000 ≡ ±480 Hz	
			12	Ramp function generator output (NSET1-RFG1-OUT)	±24000 ≡ ±480 Hz	
			13	jFIF-OUT.W1	16 Bit or 0 ... 65535	
			14	FIF-OUT.W2	16 Bit or 0 ... 65535	
			15	FIF-OUT.W3	0 ... 65535	
			16	FIF-OUT.W4	0 ... 65535	
			17	DRIVECOM control word (DRIVECOM-CTRL)	16 Bit	
			18	DRIVECOM status word (DRIVECOM-STAT)	16 Bit	

The bit status information or the actual values of the controllers can be freely assigned to the max. 10 process data input words (PIW) of the master.

- To call DRIVECOM-conform status information, assign the DRIVECOM status word to a PIW (C1511/x = 18).
  – The FIF status word 1 is mapped to the DRIVECOM status word.
- You can call enhanced status information using the FIF status words. (📖 3-20)

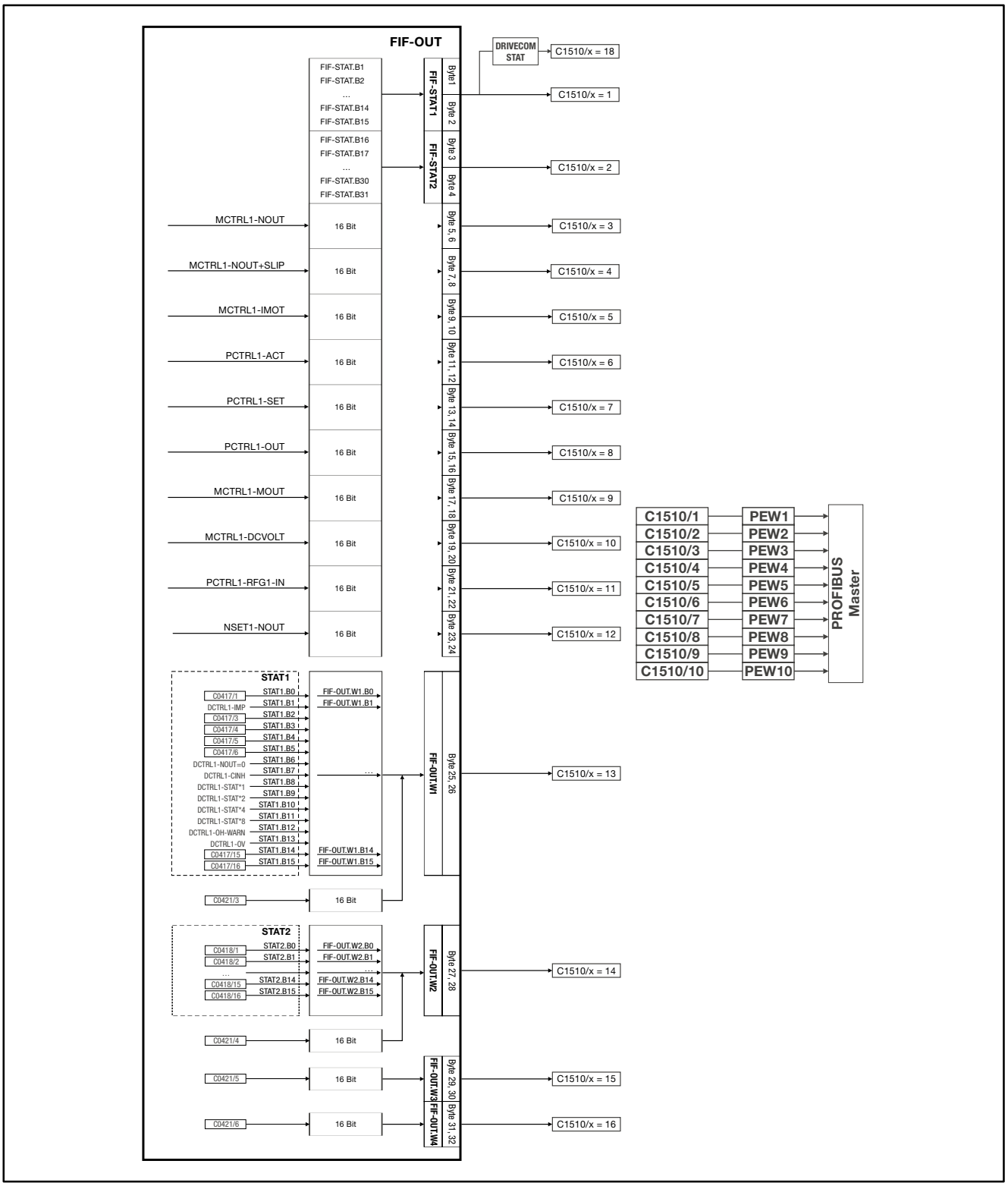


Fig. 3-4 Free configuration of the 10 process input words of the PROFIBUS-DP

Parameter structure “DRIVECOM status word“ (DRIVECOM-STAT):

Bit	Meaning
0	**Controller status ”READY TO START”**
0	Status less than ”READY TO START”
1	Status at least ”READY TO START”
1	**Controller status ”READY TO START”**
0	Status less than ”SWITCHED ON”
1	Status at least ”SWITCHED ON”
2	**Controller status ”OPERATION ENABLED”**
0	Status less than ”OPERATION ENABLED”
1	Status at least ”OPERATION ENABLED”
3	**Controller status ”FAULT”**
0	no fault (TRIP)
1	Fault (TRIP) occurred
4	**Status command ”Inhibit voltage”**
0	Command
1	No command
5	**Status command ”Quick stop”**
0	Command
1	No command
6	**Controller status ”SWITCH-ON INHIBIT”**
0	Status not ”SWITCH-ON INHIBIT”
1	Status ”SWITCH-ON INHIBIT”
7	**Collective warning**
0	No warning
1	Warning (overheat)
8	**Collective message** Automatic setting and resetting of pulse inhibit in the controller status ”OPERATION ENABLED”. Possible causes: Undervoltage, overvoltage or overcurrent.
0	No message
1	Message IMP active
9	Bus access authorization
1	always
10	**Status speed/change difference**
0	RFG_{on} < > HLG_{off}
1	RFG_{on} = RFG_{off}
11	**Status DRIVECOM speed limitation**
0	always
12	Mapping of FIF status word 1 (FIF-STAT1), bit 0 (DCTRL1-PAR-B0)
13	Mapping of FIF status word 2 (FIFSTAT2), bit 0 (DCTRL1-PAR-B1)
14	Mapping of FIF status word 1 (FIFSTAT1), bit 2 (MCTRL1-IMAX)
15	Mapping of FIF status word 1 (FIF-STAT1), bit 5 (PCTRL1-QMIN)

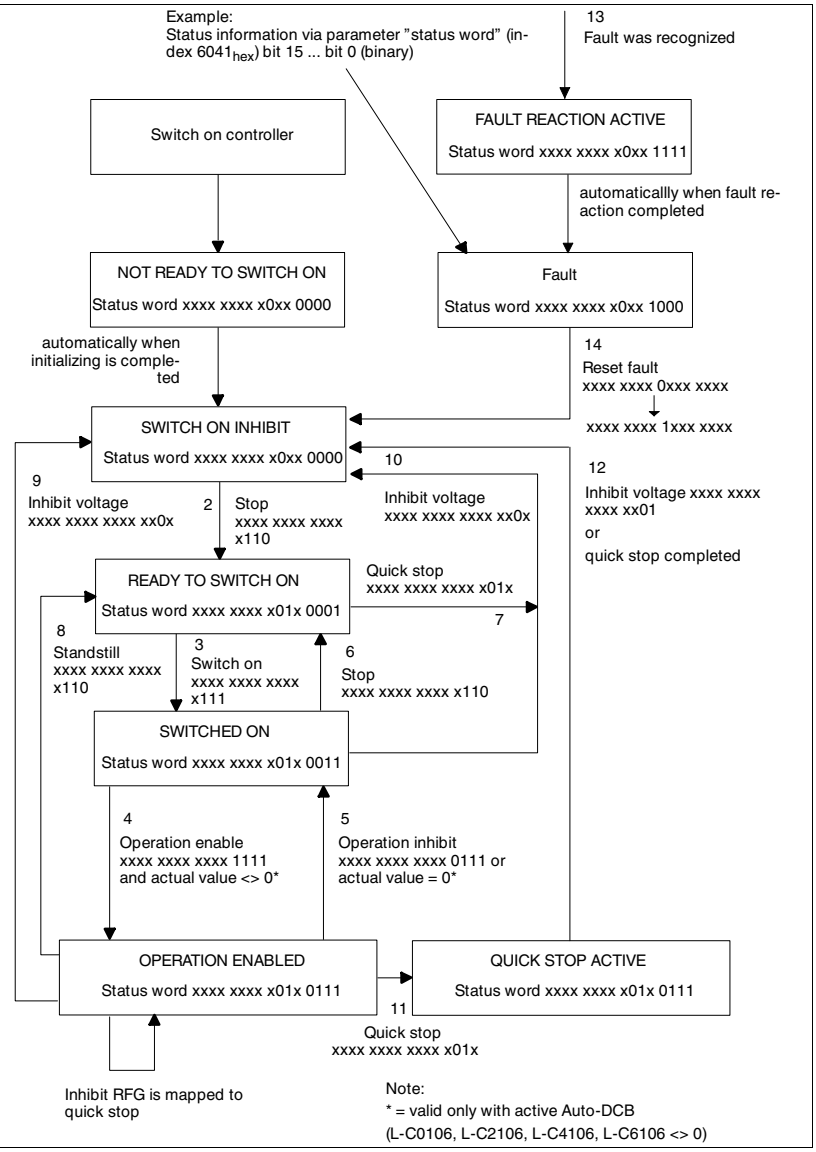
Structure of the parameter FIF status word (FIF-STATx)

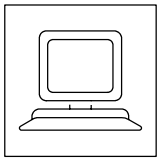
FIF status word 1 (FIF-STAT1)		FIF status word 2 (FIF-STAT2)	
Bit	**Assignment**	**Bit**	**Assignment**
0	**Momentary parameter set bit 0 (DCTRL1-PAR-B0)** 0 Parameter set 1 or 3 active 1 Parameter set 2 or 4 active	**0**	**Momentary parameter set bit 1 (DCTRL1-PAR-B1)** 0 Parameter set 1 or 2 active 1 Parameter set 3 or 4 active
1	**Pulse inhibit (DCTRL1-IMP)** 0 Power outputs enabled 1 Power outputs inhibited	**1**	**TRIP or Q_{min} or pulse inhibit active (DCTRL1-TRIP-QMIN-IMP)** 0 false 1 true
2	**I_{max} limit (MCTRL1-IMAX)** (If C0014 = -5-: torque setpoint) 0 not reached 1 reached	**2**	**PTC warning active (DCTRL1-PTC-WARN)** 0 false 1 true
3	**Output frequency = Frequency setpoint (DCTRL1-RFG1=NOUT)** 0 false 1 true	**3**	**C0054 < C0156 (DCTRL1-IMOT<ILIM)** 0 false 1 true
4	**Ramp function generator input 1 = ramp function generator output 1 (NSET1-RFG1-I=0)** 0 false 1 true	**4**	**C0054 < C0156 and Q_{min} threshold reached (DCTRL1-(IMOT<ILIM)-QMIN)** 0 false 1 true
5	**Q_{min} threshold (PCTRL1-QMIN)** 0 not reached 1 reached	**5**	**C0054 < C0156 and NSET1-RFG1-I=0 (DCTRL1-(IMOT<ILIM)-RFG-I=0)** 0 false 1 true
6	**Output frequency = 0 (DCTRL1-NOUT=0)** 0 false 1 true	**6**	**LP1 warning (fault in the motor phase) active (DCTRL1-LP1-WARN)** 0 false 1 true
7	**Controller inhibit (DCTRL1-CINH)** 0 Controller enabled 1 Controller inhibited	**7**	**$f < f_{min}$ (NSET1-C0010...C0011)** 0 false 1 true
11|10|9|8	**Controller status (DCTRL1-STAT*1 ... DCTRL1-STAT*8)** 0000 Controller initialization 0001 Switch-on inhibit 0011 Operation inhibited 0100 Flying-restart circuit active 0101 DC-injection brake active 0110 Operation enabled 0111 Message active 1000 Active fault	**8**	**TRIP active (DCTRL1-TRIP)** 0 false 1 true
		9	**Motor is running (DCTRL1-RUN)** 0 false 1 true
		10	**Motor running clockwise (DCTRL1-RUN-CW)** 0 false 1 true
		11	**Motor running counterclockwise (DCTRL1-RUN-CCW)** 0 false 1 true
12	**Heat warning (DCTRL1-OH-WARN)** 0 No warning 1 ϑ_{max} - 10 °C reached	**12**	Reserved
13	**DC-bus overvoltage (DCTRL1-OV)** 0 No overvoltage 1 Overvoltage	**13**	Reserved
14	**Direction of rotation (DCTRL1-CCW)** 0 CW rotation 1 CCW rotation	**14**	**C0054 > C0156 and NSET1-RFG1-I=0 (DCTRL1-(IMOT>ILIM)-RFG-I=0)** 0 false 1 true
15	**Ready for operation (DCTRL1-RDY)** 0 Not ready for operation (fault) 1 Ready for operation (no fault)	**15**	Reserved

3.5.3.3 The DRIVECOM status machine

The fieldbus function module supplies the control information via the control word.

- The controllers have standardized controller states according to DRIVECOM profile 20.
- The information about the momentary controller status are saved in the DRIVECOM parameter "Status word".
- Commands in the DRIVECOM parameter "Control word" can change the controller status. These commands are marked by arrows in the diagram.





Automation

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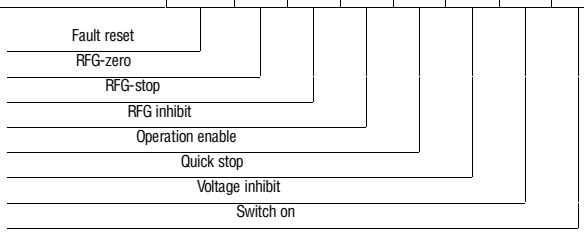
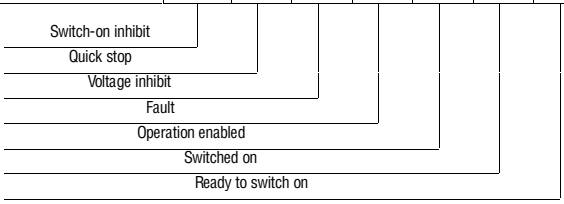
Bit control commands		The bit control commands of the control word depend on other bit settings. The command is executed only with the following bit patterns:								
		Bits of the control word								**Note**
Command	**Meaning**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**	
Stop	From different controller states ⇨ "READY TO START"	x	x	x	x	x	1	1	**0**	1 Bit set
Switch on	Transition ⇨ "SWITCHED ON"	x	x	x	x	x	1	1	**1**	
Operation enable	Transition ⇨"OPERATION ENABLED" The controller inhibit is deactivated.	x	x	x	x	**1**	1	1	1	0 Bit not set
Inhibit operation	Transition ⇨ "SWITCHED ON" The controller inhibit is activated.	x	x	x	x	**0**	1	1	1	
Voltage inhibit	Transition ⇨ "SWITCH ON INHIBIT" The controller inhibit is activated.	x	x	x	x	x	x	**0**	x	x Any bit
Quick stop	Transition ⇨ "SWITCH ON INHIBIT" If the drive was enabled ⇨ controlled deceleration along the Lenze quick stop ramp.	x	x	x	x	x	**0**	1	x	
Fault reset	Acknowledge fault. If the fault is removed, automatically ⇨ "SWITCH ON INHIBIT"	0 ⇨1	x	x	x	x	x	x	x	



Status bits		The current controller status is unambiguously coded in bits 0 to 6 of the status word:							
		Bits of the status word							**Note**
Unit status	**Meaning**	**6**	**5**	**4**	**3**	**2**	**1**	**0**	
NOT READY TO SWITCH ON	Controller is being initialized and is not yet ready to operate. After initialization automatically ⇨ "READY TO START"	0	x	x	0	0	0	0	1 Bit set
SWITCH ON INHIBIT	Controller inhibited (CINH). Waiting for "Stop" command.	1	x	x	0	0	0	0	
READY TO SWITCH ON	Controller inhibited (CINH). Waiting for "Switch on" command.	0	1	x	0	0	0	1	0 Bit not set
SWITCHED ON	Controller inhibited (CINH). Waiting for "Enable operation" command.	0	1	x	0	0	1	1	
OPERATION ENABLED	Controller enabled ($\overline{\text{CINH}}$). Pulse inhibit can be set automatically.	0	1	x	0	1	1	1	x Any bit
FAULT REACTION ACTIVE	Fault (TRIP) was recognized, a fault response initiated. Then, automatically ⇨ "TRIP"	0	x	x	1	1	1	1	
FAULT	Controller is in the status "FAULT"	0	x	x	1	0	0	0	
QUICK STOP ACTIVE	Command "Quick stop" was sent in the controller status "Operation enabled". ⇨ Controlled deceleration along the quick stop ramp After deceleration automatically ⇨ "SWITCH ON INHIBIT"	0	0	x	0	1	1	1	



3.6 Troubleshooting and fault elimination

Two LEDs on the function module indicate the status:

	Green LED	Yellow LED
Blinking	The initialization between function module and controller has not yet been carried out.	Telegram receipt
On	Function module is connected to voltage supply, no fault.	-
Off	Function module is not connected to voltage supply.	No telegram receipt

Fault	Possible cause	Remedy
PROFIBUS-DP master indicates bus error and yellow LED on the function module is off	Short circuit/Wire breakage	Check PROFIBUS-DP wiring
	Bus termination not switched on	Connected the bus terminating resistor to the last bus device. (📖 3-2)
	Incorrect station address in C1509	Set correct station address. (📖 3-6)
PROFIBUS-DP master indicates bus error and yellow LED on the function module is blinking	Incorrect PROFIBUS-DP configuration data	Check the configuration data sent by the master under C1526. Allowed configuration data: 📖 3-6
Drive cannot be enabled	No enable via control word	Send $007F_{hex}$
	Controller inhibit active via terminal	X3/28 = HIGH (+12 ... +30 V)
	No setpoint entered	C0412/1 = 200 (setpoint source PROFIBUS-DP) must be set
		Assign process output data to setpoint under C1511

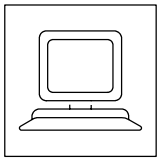
3.7 Code table function module PROFIBUS-DP

How to read the code table:

Column	Abbreviation		Meaning	
Code	Cxxxx		Code Cxxxx	• The parameter value of the code can be defined different for each parameter set.
	Cxxxx 1		Subcode 1 of Cxxxx	
	Cxxxx 2		Subcode 2 of Cxxxx	
	Cxxxx*		The parameter value of the code is the same in all parameter sets.	
Name			Name of the code	
Lenze			Lenze setting (value set at delivery or after overwriting of C0002 with Lenze setting).	
Selection	1	{1 %} 99	Min. value {Steps/unit} Max. value	
IMPORTANT	🕮 Page x		Brief, important explanations. Indicates where to find more detailed information.	

Code		Possible settings		IMPORTANT	
No.	Name	Lenze	Selection	Standardization / Parameter channel	
C1500	Software identification			Output as a string: 82SAFP0B_xy000	
C1502	Software identification			Output as a string in 4 parts à 4 characters	
1	Part 1				
...	...				
4	Part 4				
C1501	Software generation date			Output as a string: mmm tt jjjj hh:mm	
C1503	Software generation date			Output as a string in 4 parts à 4 characters	
1	Part 1				
...	...				
4	Part 4				
C1509	PROFIBUS-DP station address	3	3 {1} 126	For a unambiguous identification, every bus device must have another station address.	🕮 3-6

Code		Possible settings			IMPORTANT		
No.	Name	Lenze	Selection		Standardization	Parameter channel	
C1510	Configuration process input data master				Assigns status information or actual values of the controller to the process data input words of the master.		📖 3-17
1	PIW1	18	1	FIF status word 1 (FIF-STAT1)	16 Bit	-	
2	PIW2	3	2	FIF status word 2 (FIF-STAT2)	16 Bit	-	
3	PIW3	4	3	Output frequency with slip (MCTRL1-NOUT+SLIP)	±24000 ≡ ±480 Hz	C0051 when C0238 = 2	
4	PIW4	5	4	Output frequency without slip (MCTRL1-NOUT)	±24000 ≡ ±480 Hz	C0050	
5	PIW5	6	5	Apparent motor current (MCTRL1-IMOT)	2^{14} ≡ 100 % rated controller current	C0054	
6	PIW6	7	6	Act. process controller value (PCTRL1-ACT)	±24000 ≡ ±480 Hz	C0051 when C0238=0, 1	
7	PIW7	8	7	Process controller setpoint (PCTRL1-SET1)	±24000 ≡ ±480 Hz		
8	PIW8	9	8	Process controller output (PCTRL1-OUT)	±24000 ≡ ±480 Hz		
9	PIW9	10	9	Controller load (MCTRL1-MOUT)	±2^{14} ≡ ±100 % rated motor torque		
10	PIW10	11	10	DC-bus voltage (MCTRL1-DCVOLT)	1ph: 960 ≡ DC 400 V 3ph: 975 ≡ DC 800 V	C0053	
			11	Ramp function generator input (NSET1-RFG1-IN)	±24000 ≡ ±480 Hz		
			12	Ramp function generator output (NSET1-RFG1-OUT)	±24000 ≡ ±480 Hz		
			13	FIF-OUT.W1	16 Bit or 0 ... 65535		
			14	FIF-OUT.W2	16 Bit or 0 ... 65535		
			15	FIF-OUT.W3	0 ... 65535		
			16	FIF-OUT.W4	0 ... 65535		
			17	DRIVECOM control word (DRIVECOM-CTRL)	16 Bit		
			18	DRIVECOM status word (DRIVECOM-STAT)	16 Bit		
C1511	Configuration process output data master				Assigns process data output words of the master to bit control commands or setpoints of the controller. **Modification of C1511 automatically inhibits process output data to ensure data consistency.** Enable again under C1512.		📖 3-13
1	POW1	17	1	FIF control word 1 (FIF-CTRL1)	16 Bit	-	
2	POW2	3	2	FIF control word 2 (FIF-CTRL2)	16 Bit	-	
3	POW3	4	3	Setpoint 1 (NSET1-N1)	±24000 ≡ ±480 Hz	C0046	
4	POW4	5	4	Setpoint 2 (NSET1-N2)	±24000 ≡ ±480 Hz	C0044	
5	POW5	6	5	Additional setpoint (PCTRL1-NADD)	±24000 ≡ ±480 Hz	C0049	
6	POW6	7	6	Act. process controller value (PCTRL1-ACT)	±24000 ≡ ±480 Hz	C0051 when C0238=1, 2	
7	POW7	8	7	Process controller setpoint (PCTRL1-SET)	±24000 ≡ ±480 Hz	C0138	
8	POW8	9	8	Reserved			
9	POW9	10	9	Torque setpoint or torque limit value (MCTRL1-MSET)	2^{14} ≡ 100 % rated motor torque	C0047	
10	POW10	11	10	PWM voltage (MCTRL1-VOLT-ADD)	**Only for special applications. Modifications only when agreed on by Lenze!**		
			11	PWM phase (MCTRL1-PHI-ADD)			
			12	Reserved			
			13	FIF-IN.W1	16 Bit or 0 ... 65535		
			14	FIF-IN.W2	16 Bit or 0 ... 65535		
			15	FIF-IN.W3	0 ... 65535		
			16	FIF-IN.W4	0 ... 65535		
			17	DRIVECOM control word (DRIVECOM-CTRL)	16 Bit		



Automation

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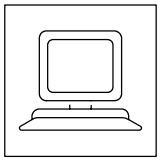
Code		Possible settings		IMPORTANT		
No.	Name	Lenze	Selection	Standardization	Parameter channel	
C1512	Enable process output data		0 {1} 65535 65535 = enable all POW10 POW9 ... POW3 POW2 POW1 2^9 2^8 ... 2^2 2^1 2^0	The decimal value of the bit settings enables any combinations of the process output words. • 0 = Inhibit output word • 1 = Enable output word		📖 3-13
C1513	Response monitoring time PCD communication		0 {1 ms} 65534 0 = switched off	display only Value is provided by the master		
C1514	Action in case of PCD communication error	0	0 No action 1 TRIP (fault) 2 CINH (controller inhibit) 3 QSP (quick stop)	When the master does not send a message within the response monitoring time, the action set under C1514 is performed.		
C1516	PROFIBUS-DP baud rate		0 12 MBit/s 1 6 MBit/s 2 3 MBit/s 3 1.5 MBit/s 4 500 kbit/s 5 187.5 kBit/s 6 93.75 kBit/s 7 45.45 kBit/s 8 19.2 kBit/s 9 9.6 kBit/s	display only		
C1520	All words to the master		0 {1} 65535	display only		
1	PIW1					
...	...					
10	PIW10					
C1521	All words from the master					
1	POW1					
...	...					
10	POW10					
C1522	All words to the controller					
1	FIF-IN, word1 ... word 16					
...						
16						
C1523	All words from the controller					
1	FIF-OUT, word1 ... word 16					
...						
16						
C1526	last configuration data					
1	1st byte					
2	2nd byte					
3	3rd byte					

Code		Possible settings		IMPORTANT	
No.	Name	Lenze	Selection	Standardization	Parameter channel
C1530	PROFIBUS-DP diagnostics		Bit Meaning 0 Reserved 1 Reserved 2 Reserved 3 Reserved 5|4 Status of the DP state machine (DP-STATE) 00 "WAIT_PRM" 01 "WAIT_CFG" 10 "DATA_EX" 11 not possible 7|6 Status of the watchdog state machine (WD-STATE) 00 "BAUD_SEARCH" 01 "BAUD_CONTROL" 10 "DP_CONTROL" 11 not possible 11|10|9|8 The PROFIBUS-DP baud rate recognized by the SPC3 0000 12 MBit/s 0001 6 MBit/s 0010 3 MBit/s 0011 1.5 MBit/s 0100 500 kbit/s 0101 187.5 kBit/s 0110 93.75 kBit/s 0111 45.45 kBit/s 1000 19.2 kBit/s 1001 9.6 kBit/s 12 Reserved 13 Reserved 14 Reserved 15 Reserved	display only	
C1531	Bus states			Output of bus states	
1	Counter 1		Data cycles per seconds	Countes count up to 65535 and then restart at zero.	
2	Counter 2		Total data cycles		
3	Counter 3		Total parameterization events		
4	Counter 4		Total configuration events		



4 Function module INTERBUS

4.1 Description

The function module INTERBUS is a component for the frequency inverters 8200 motec and 8200 vector, which connects the controllers to the serial, standardized communication system INTERBUS.

The controllers can also be retrofitted.

4.2 Technical data

Communication medium	RS485
Drive profile	DRIVECOM profile “Power transmission 20”
Baud rate [kBit/s]	500
INTERBUS device	Slave
Network topology	Ring (go and return path in the same bus cable)
Process data words (PCD) (16 Bit)	1 word ... 6 words
Parameter data words (PCP) (16 Bit)	0/1 words
INTERBUS code (ID code)	decimal: 227; 3 hex: E3; 3 (📖 LEERER MERKER)
Maximum PDU length	64 byte
Supported PCP services	Initiate, abort, status, identify, Get-0V-long, read, write
number of devices	depending on the master system (I/O area), max. 63
max. distance between two devices	400 m
Communication time	• Total of cycle time and the processing time in the fieldbus devices. The times are independent of each other. • Processing time in the controller: – Parameter data and process data are indpendent of each other. – Parameter data (PCP): approx. 30 ms + 20 ms tolerance – Process data: approx. 3 ms + 2 ms tolerance
Electrical connection	Screw terminals Terminal for controller inhibit (CINH) available Cable diameter: max. 1mm^2 (AWG18) Tightening torque: 0.5 ... 0.6 Nm (4.4 ... 5.3 lbin)
DC supply voltage	• Internal • External – Necessary only when the communication ring must not be interrupted by disconnection or failure of a bus device. – Supply via separate switch mode power supply – +24 V DC ±10 %, max. 90 mA – X3/59 can be loaded with max. 3 A when the supply voltage is connected through to other bus devices.
Insulation voltage to PE	50 V AC
Type of protection	IP20
Ambient temperature	during operation: -10 ... +60 °C Transport: -25 ... +60 °C Storage: -25 ... +60 °C
Climatic conditions	Class 3K3 to EN 50178 (without condensation, average relative humidity 85 %)
Dimensions (L x W x H)	65 mm x 50 mm x 23 mm

Contact addresses	Phoenix Contact Postfach 1341 D-32819 Blomberg Tel: 0 52 35 / 3-00, Fax: 0 52 35 / 34-12 00 http:/www.phoenixcontact.com	InterBus-S-CLUB Jacob-Diehl-Straße 30 67611 Kaiserslautern Tel: 06 31 / 7 94 24, Fax: 06 31 / 9 76 58 http:/www.interbusclub.com

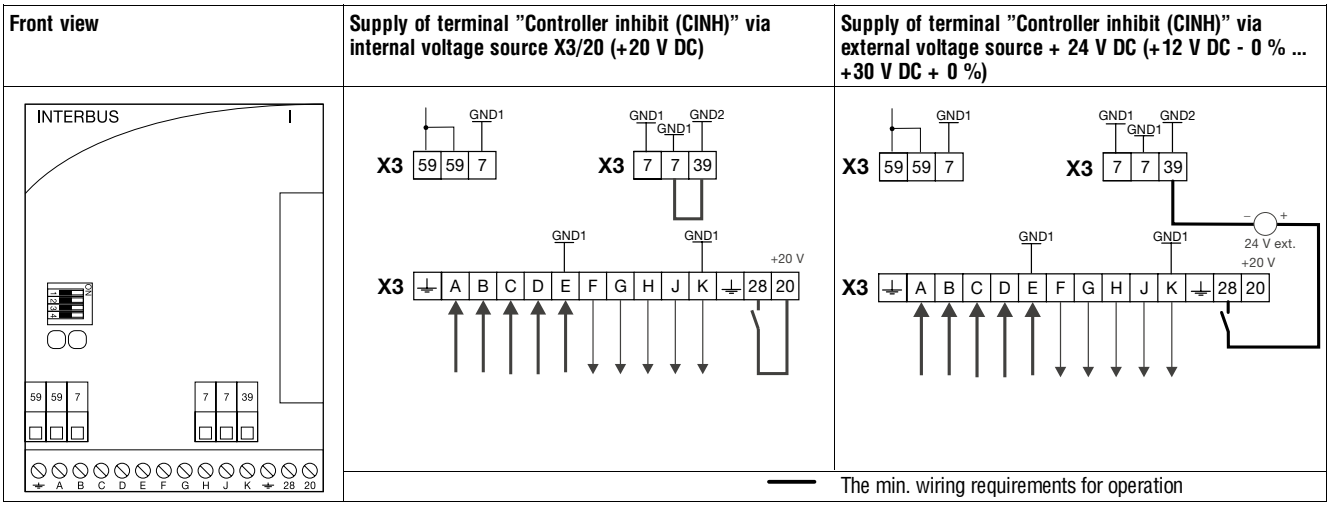
4.3 Installation

4.3.1 Mechanical installation

See Instructions of the function module

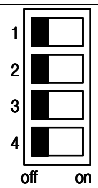
4.3.2 Electrical installation

4.3.2.1 Terminal assignment



X3/	Input (I) / output (O)	Explanation	
59	I	External DC supply, reference X3/7	Cable diameter: max. 1 mm² (AWG18) Tightening torque: 0.5 ... 0.6 Nm (4.4 ... 5.3 lbin)
7	-	GND1, reference potential 1	
39	-	GND2, reference potential for X3/28 (CINH)	
⊥	-	PES, additional HF screen connection	
O	I	RS485 data line /D01	
B	I	RS485 data line D01	
C	O	RS485 data line /DI1	
D	O	RS485 data line DI1	
I	-	Reference potential incoming line	
F	O	RS485 data line /D02	
G	O	RS485 data line D02	
H	I	RS485 data line /DI2	
J	I	RS485 data line DI2	
K	-	Reference potential outgoing line	
28	I	Controller inhibit (CINH) • Start = HIGH (+12 V ... +30 V) • Stop = LOW (0 ... 3 V)	
20	O	+20 V internal for CINH, reference: X3/7	

Fig. 4-1 Terminal assignment of the function module INTERBUS

Possible settings of the DIP switch							
	**4**	**3**	**2**	**1**	**Process data words (PCD)**	**PCP data words (PCP)**	**ID code**
	OFF	OFF	OFF		2	1	227
	OFF	OFF	ON		3	1	227
	OFF	ON	OFF		4	1	227
	OFF	ON	ON		5	1	227
	ON	OFF	OFF		2	0	3
	ON	OFF	ON		4	0	3
	ON	ON	OFF		6	0	3
	ON	ON	ON		☞ C1515		
				OFF	Last bus device		
				ON	All other bus devices		

4.3.2.2 Wiring with a host (PC or PLC)

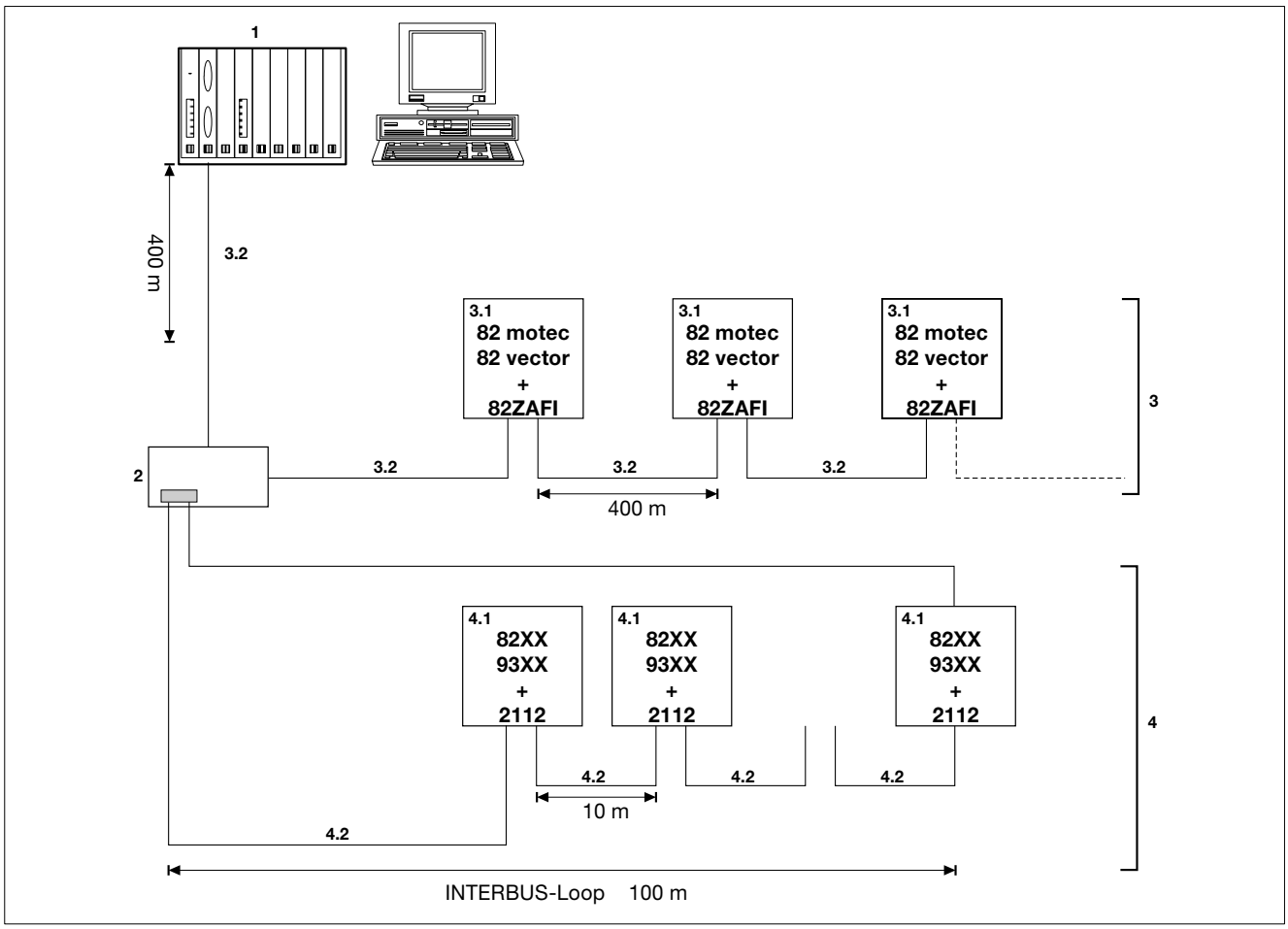


Fig. 4-2 Basic structure of an INTERBUS network

Elements of the INTERBUS network		
No.	**Element**	**Function**
1	Host (e.g. PC or PLC) with INTERBUS master interface module	Master
2	INTERBUS loop bus terminal	Connects the remote bus and the INTERBUS loop (network nodes)
3	Remote bus	Connection ● Host interface module ⇨ first bus terminal or first Lenze controller with INTERBUS module ● Bus terminal ⇨ Lenze controller with INTERBUS module ● Lenze controller with INTERBUS module ⇨ Lenze controller with INTERBUS module
3.1	Remote bus module	Bus device in the remote bus; e.g. Lenze controller with INTERBUS module (slave). Here, networking does not require a bus terminal.
3.2	Remote bus cable	Connects the INTERBUS master interface module with the bus terminal and/or the remote bus modules.
4	INTERBUS loop	Bus terminal and max. 8 local bus devices
4.1	INTERBUS loop module	Bus devices in the INTERBUS loop, e.g. Lenze cotnroller with INTERBUS loop module 2112
4.2	INTERBUS loop cable	Connection in the loop

Tip!

The controller has a double basic insulation according to VDE 0160. An additional mains insulation is not required.

4.4 Commissioning of function module

Stop!

- Before switching on the mains voltage, check the wiring for completeness, earth fault and short circuit.
- **Keep to the switch-on sequence!**

4.4.1 Initial switch-on

Step	Lenze setting	Note
1. Set DIP switch on the function module. (📖 4-2)	2 process data words, 1 PCP data word Controller is last the bus device	• User data length in words, 16 bits each with switches 4,3, and 2. • Adapt switch 1 to every bus device.
2. If PCP communiation is used, configure additional master system for PCP communication. (📖 4-8)		
3. Connect mains voltage of the controller and, if necessary, the external supply of the function module.		The green LED on the function module is illuminated (visible only on 8200 vector).
4. You can communicate now with the controller.		
5. If PCP communication is used, carry out PCP service “Initiate“. (📖 4-9)		Now, you can access the controller parameters using the PCP services “Read“ and “Write“. (📖 4-9)
6. If necessary, adapt the codes to your application.		See Operating Instructions of the controller
7. Select fieldbus function module as source for control commands and setpoints: C0005 = 200.		Necessary setting to communicate with the controllers via fieldbus.
8. Assign process output words (POW) of the master via C1511 to the process input words of the controller. (📖 4-12)	POW1: DRIVECOM control word (DRIVECOM CTRL) POW2: Setpoint1 (NSET1-N1) POW3: Setpoint2 (NSET1-N2) POW4: Additional setpoint (PCTRL1-NADD) POW5: Act. process controller value (PCTRL1-ACT) POW6: Process controller setpoint (PCTRL1-SET1)	Just assign the number of process data words of the master set using DIP switches or C1515 to the process data words of the controller. Example: DIP switch setting = 2 process data words ⇨ Assign POW1 and POW2 (PIW1 and PIW2) to the desired process data words of the controller.
9. Assign process output words of the controller to the process input words (PIW) of the master via C1510. (📖 4-16)	PIW1: DRIVECOM status word (DRIVECOM STAT) PIW2: Output frequency with slip (MCTRL1-NOUT+SLIP) PIW3: Output frequency without slip (MCTRL1-NOUT) PIW4: Apparent motor current (MCTRL1-IMOT) PIW5: Act. process controller value (PCTRL1-ACT) PIW6: Process controller setpoint (PCTRL1-SET1)	
10. Enable process output data: C1512 = 65535.		Only necessary when C1511 was changed.
11. Enable controller via terminal.		X3/28 = HIGH
12. Select the setpoint.		Master sends setpoint via selected POW.
13. Change to state “READY TO START“:		Master sends DRIVECOM control word = 0000 0000 0111 1110_{bin} ($007E_{hex}$).
14. Controller is “READY TO START“.		Master receives DRIVECOM status word = xxxx xxxx x01x $0001_{bin.}$
15. Change to state “OPERATION ENABLED“.		Master sends DRIVECOM control word = 0000 0000 0111 1111_{bin} ($007F_{hex}$).
16. The drive is now running.		

4.4.2 Create complete DRIVECOM compatibility

The DRIVECOM profile is a non-proprietary specification of important parameters and device performance. The DRIVECOM profile 20 describes the device control. To achieve complete DRIVECOM compatibility, deactivate Lenze-specific functions.

Controller	Deactivate function		Drive performance with activated function
8200 motec	Automatic DC injection braking (Auto-DCB)	L-C0106 = 0, L-C2106 = 0, L-C4106 = 0, L-C6106 = 0	Holding time Auto-DCB ≠ 0: After the holding time has elapsed and at zero speed, the controller changes automatically from the state "OPERATION ENABLED" to state SWITCHED ON". If the actual value is higher than 0, it changes automatically to the state "OPERATION ENABLED".
8200 vector			

4.5 Set up INTERBUS communication

INTERBUS transmits two different types of data between the host and the controllers via different communication channels:

Data		Communication channel used
Parameters e.g. operating parameters, diagnostic information, motor data	The transmission of parameters is not as time-critical as the transmision of process data.	**Parameter channel** • Enables the access to all Lenze codes. • Transmission of the parameters using PCP services (PCP = Peripherials Communication Protocol). (📖 4-8) • Parameter changes are normally saved in the controller (observe C0003).
Process data e.g. setpoint and actual values	Data must be exchanged in the shortest possible time.Small amounts of data which are transmitted cyclically.	**Process-data channel** • You can control the controller using DRIVECOM process data (📖 4-20). The host has direct access to the process data. In the PLC, for instance, the data are directly assigned to the I/O area. • Process data are transmitted cyclically (constant exchange between host and controllers). • Process data are not saved in the controller.

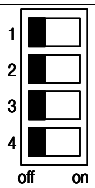
4.5.1 Determine user data length

Set the INTERBUS user data length using the DIP switches on the front side of the function module or under C1515.

Tip!

- The DIP switch has priority over C1515.
- Changes on the DIP switch and under C1515 are effective only after mains connection!
- You can see the momentary switch setting under C1525.

Possible settings of the DIP switch



4	3	2	1	Process data words (PCD)	PCP data words (PCP)	ID code
OFF	OFF	OFF		2	1	227
OFF	OFF	ON		3	1	227
OFF	ON	OFF		4	1	227
OFF	ON	ON		5	1	227
ON	OFF	OFF		2	0	3
ON	OFF	ON		4	0	3
ON	ON	OFF		6	0	3
ON	ON	ON		☞ C1515		
			OFF	Last bus device		
			ON	All other bus devices		

Code		Possible settings		IMPORTANT	
No.	Name	Lenze	Selection	Standardization	Parameter channel
C1515	Process data specification		0 ... 6 as DIP switch 11 ... 16 1 ... 6 words PCD, no PCP 11 (1 word PCD) ... 16 (6 words PCD) 21 ... 25 1 ... 5 words PCD, 1 word PCP 21 (1 word PCD) ... 25 (5 words PCD)	Change process data specification using software switches. C1515 is active only when the DIP switch on the front side of the module is set as follows: 4 = ON, 3 = ON, 2 = ON. Modification will be effective only after mains connection.	

4.5.2 Configure parameter channel (PCP communication)

In the following, you will find all the parameters and their contents which are returned by the Lenze controllers. All other transmission parameters of the stated PCP services can be obtained from the corresponding host description.

4.5.2.1 Initialize PCP communication

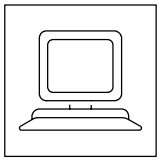
Enter the following entries into the communication reference list to enable the communication between master and function module:

Parameters	Value	Explanation
COM_REF	2 or higher	Communication reference (CR)
CONN_TYPE	Acyclic master/slave	Connection type
CONN_ATTR	Defined	Connection attribute
Max PDU sending high prio	0	Sending history high priority
Max PDU sending low prio	64	Sending history low priority
Max PDU receiving high prio	0	Receiving history high priority
Max PDU receiving low prio	64	Receiving history low priority
Supported service request	803000_{hex}	Supported service, master request
Supported Services Response	000000_{hex}	Supported service, slave response
Maximum SCC	1	
Maximum RCC	0	
Maximum SAC	0	
Maximum RAC	0	

4.5.2.2 Available PCP services

Initiate	Parameters returned by the controller		
	Field name	**Value**	**Meaning**
Establishes a logic connection between master and the function module INTERBUS.	Profile number	20_{hex}	DRIVECOM profile of version 0
	Password	0	Password function of PROFIBUS is not supported
	Access groups	0	No access groups
	Access protection supported	TRUE	Access protection is supported
	Version OV	0	Version of the object directory

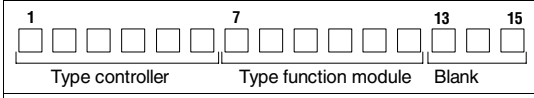
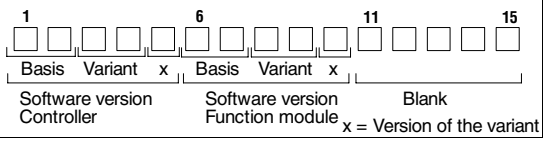
Read and write	Possible error messages			
	Error class	**Error code**	**Additional code**	**Meaning**
• "Read" reads parameters from the controller. The controller transmits the required parameter or a fault message. • "Write" writes parameters to the controller. The controller transmits a positive or negative acknowledgement or a fault message.	6	3	00_{hex}	No access
	6	5	10_{hex}	Invalid service parameter
	6	5	11_{hex}	Invalid subindex
	6	5	12_{hex}	Data too long
	6	5	13_{hex}	Data too short
	6	6	00_{hex}	Object is not a parameter
	6	7	00_{hex}	Object does not exist
	6	8	00_{hex}	Data types are not identical
	8	0	00_{hex}	Service cannot be executed
	8	0	20_{hex}	Service cannot be executed currently
	8	0	21_{hex}	Cannot be executed because of local control
	8	0	22_{hex}	Cannot be executed because of controller status
	8	0	30_{hex}	Leave value range/Parameters can only be changed during controller inhibit
	8	0	31_{hex}	Parameter value too high
	8	0	32_{hex}	Parameter value too small
	8	0	33_{hex}	Subparameter out of value range
	8	0	34_{hex}	Subparameter value too high
	8	0	35_{hex}	Subparameter value too small
	8	0	36_{hex}	Maximum value smaller than minimum value
	8	0	41_{hex}	Communication object cannot be mapped to process data
	8	0	42_{hex}	Process-data length exceeded
	8	0	43_{hex}	Collision with other values



Automation

INTERBUS

Abort	Aborts a logic connection between master and function module.
Get-OV	Reads the object desription for every parameters and data type.

Identify	**Parameters transmitted by the controller**		
	Field name	**Value**	**Meaning**
Supplies information for the identification of the controller.	Manufacturer	Visible String “Lenze“	Company name
	Controller name	Visible string (15 characters)	Unit name for controller and fieldbus module
			
	Controller version		Software version of the controller and fieldbus module
			

Status	**Parameters transmitted by the controller**		
	Status	**Value**	**Meaning**
Supplies status information of the controller.	Logical status	0 = ready to communicate	Current operating mode of the controller in terms of communication
	Physical status		Current operating state of the controller(📖 4-20)
		0 = ready for operation	Controller state ”OPERATION ENABLED“
		1 = partly ready for operation	All other controller states
	Local detail		Parameter ”Status word“ (24 Bit)
		Bit 0 ... 15	Profile parameter ”Status word“ (Index = 6041_{hex})
		Bit 16 ... 23	Value 0

4.5.2.3 Access to Lenze parameters

Lenze parameters are addressed via Lenze codes. For Lenze parameters with the assigned value ranges, please refer to the code table of the controller.

		Addressing		
Lenze codes	In this description, Lenze codes are identified by „L-Cxxxx“, to avoid confusion with the INTERBUS index (e.g. L-C0001 for Lenze Code C0001).	• Addressing of Lenze codes via offset: – PROFIBUS-DP index = 24575 - LENZE_CODENR – INTERBUS $index_{hex}$ = $5FFF_{hex}$ - $LENZE\_CODENR_{hex}$ • Example for L-C0001 (operating mode): – INTERBUS index = 24574 (= 24575 - 1) – INTERBUS $index_{hex}$ = $5FFE_{hex}$ (= $5FFF_{hex}$ - 1_{hex})		
Lenze parameters	Lenze parameters are primarily represented in the fixed-point format (data type Integer32) with four decimal codes.	• Multiply desired parameter value with 10000. • Example: Set L-C0039 (JOG) = 150.4 Hz: – 150,4 x 10000 = 1504000_{dec} ($0016F300_{hex}$)		
Lenze parameter sets	The four parameter sets an be addressed directly with INTERBUS PCP via code offsets: Use offset 0 for parameters which occur only once! (Marked with “*”in the code tables.)	**Offset**	**Parameter set**	**Example: Address of C0011**
		0	1	11
		2000	2	2011
		4000	3	4011
		6000	4	6011

4.5.3 Configure process data channel

Assign the max. 6 process data words of INTERBUS to the process data words of the controller via the free configuration of the process data. Make the assignments in codes C1511 (process output data) and C1510 (process input data).

From the position of the master:

- The master sends process output data in max. 6 process data output words (POW) to the bus devices.
- The master receives process input data in max. 6 process data input words (PIW) from the bus devices.

4.5.3.1 Configure process output data

Code		Possible settings			IMPORTANT	
No.	Name	Lenze	Selection		Standardization	Parameter channel
C1511	Configuration process output data master				Assigns process data output words of the master to bit control commands or setpoints of the controller. **Modification of C1511 automatically inhibits process output data to ensure data consistency.** Enable again under C1512.	
1	POW1	17	1	FIF control word 1 (FIF-CTRL1)	16 Bit	-
2	POW2	3	2	FIF control word 2 (FIF-CTRL2)	16 Bit	-
3	POW3	4	3	Setpoint 1 (NSET1-N1)	±24000 ≡ ±480 Hz	C0046
4	POW4	5	4	Setpoint 2 (NSET1-N2)	±24000 ≡ ±480 Hz	C0044
5	POW5	6	5	Additional setpoint (PCTRL1-NADD)	±24000 ≡ ±480 Hz	C0049
6	POW6	7	6	Act. process controller value (PCTRL1-ACT)	±24000 ≡ ±480 Hz	C0051 when C0238 = 1, 2
			7	Process controller setpoint (PCTRL1-SET1)	±24000 ≡ ±480 Hz	C00138
			8	Reserved		
			9	Torque setpoint or torque limit value (MCTRL1-MSET)	2^{14} ≡ 100 % rated motor torque	C0047
			10	PWM voltage (MCTRL1-VOLT-ADD)	**Only for special applications. Modifications only when agreed on by Lenze!**	
			11	PWM phase (MCTRL1-PHI-ADD)		
			12	Reserved		
			13	FIF-IN.W1	16 bit or 0 ... 65535	
			14	FIF-IN.W2	16 bit or 0 ... 65535	
			15	FIF-IN.W3	0 ... 65535	
			16	FIF-IN.W4	0 ... 65535	
			17	DRIVECOM control word (DRIVECOM-CTRL)	16 Bit	
C1512	Enable process output data		0 {1} 255 255 = enable all		The decimal value of the bit settings enables any combinations of the process output words. • 0 = Inhibit output word • 1 = Enable output word	
			POW6 POW5 POW4 POW3 POW2 POW1 2^5 2^4 2^3 2^2 2^1 2^0			

The assignment of the max. 6 process data output words (POW) of the master can be freely configured to bit control commands or setpoints:

- To activate the DRIVECOM control, assign the DRIVECOM control word (C1511/x = 17) to a POW.
  - The DRIVECOM control word is mapped to the FIF control word 1.
  - The controller complies with the DRIVECOM status machine (📖 4-20).
- Use the FIF control words to set up an extended device control. (📖 4-15).
- The process output data are inhibited automatically when C1511 is modified to ensure data consistency. Under C1512, you can enable individual or all POWs.

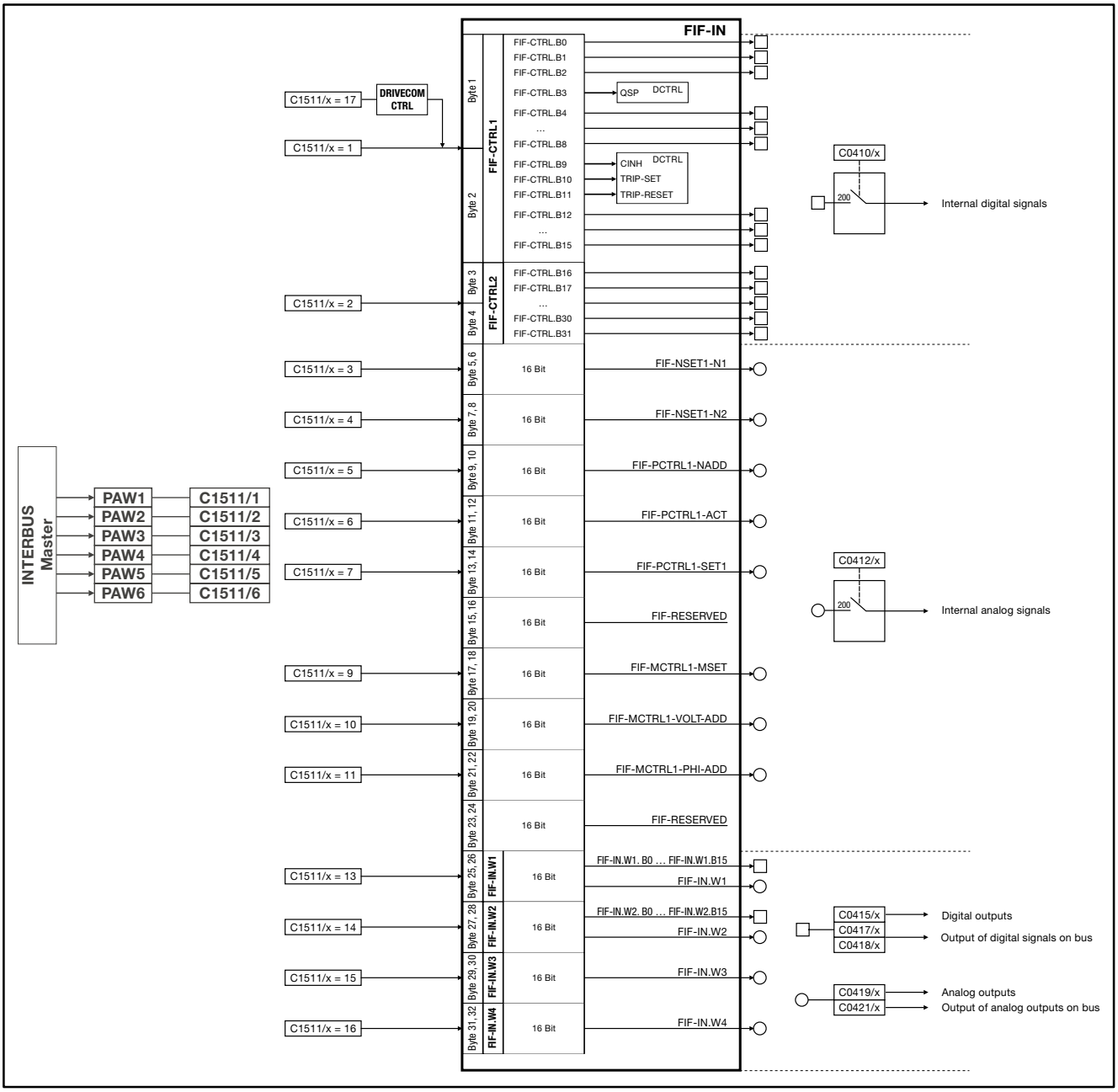
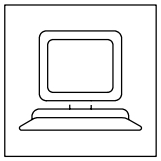


Fig. 4-3 Free configuration of the 6 process output words of INTERBUS



Structure of the parameter "DRIVECOM control word" (DRIVECOM-CTRL):

Bit		Meaning
0		**Command "Switch on"**
	0	Command "Stop" active
	1	Command "Switch on" active
1		**Command "Inhibit voltage"**
	0	Command "Inhibit voltage" active
	1	Command "Inhibit voltage" not active
2		**Command "Quick stop"**
	0	Command "Quick stop" activated
	1	Command "Quick stop" not active
3		**Command "Enable operation"**
	0	Command "Inhibit operation" active
	1	Command "Enable operation" active
4		**Command "Inhibit ramp generator"** Inhibit the ramp generator (NSET1-RFG1). The quick stop function is released; the drive remains in its status. Mapping to FIF control word 1 (FIF-CTRL1), bit 3 negated (FIF-CTRL1-QSP)
	0	Inhibit ramp generator active
	1	Inhibit ramp generator not activated
5		**Command "Stop ramp generator"** Output of the ramp generator (NSET1-RFG1) is "frozen"; the drive remains in its status. Mapping to FIF control word 1 (FIF-CTRL1), bit 4 negated (NSET1-RFG1-STOP)
	0	0 = RFG stop
	1	1 = RFG stop not active
6		**Command "Ramp generator zero"** Set input of ramp generator (NSET1-RFG1) to zero. ⇒ Controlled deceleration along the ramp set under C0013; the drive remains in its state. Mapping to FIF control word 1 (FIF-CTRL1), bit 5 negated (NSET1-RFG1-0)
	0	0 = RFG zero
	1	1 = RFG zero not active
7		**TRIP reset** Fault reset (TRIP).
	0 ⇒ 1	Bit change causes TRIP reset
8		DRIVECOM reserved
9		DRIVECOM reserved
10		DRIVECOM reserved
11		Mapping to FIF control word 1 (FIF-CTRL1), bit 10 (FIF-CTRL1-TRIP-SET)
12		Mapping to FIF control word 1 (FIF-CTRL1), bit 12 (DCTRL1-PAR2/4)
13		Mapping to FIF control word 1 (FIF-CTRL1), bit 13 (DCTRL1-PAR-3/4)
14		Mapping to FIF control word 1 (FIF-CTRL1), bit 14 (MCTRL1-DCB)
15		Not assigned

Structure of parameter FIF control word (FIF-CTRLx)

FIF control word 1 (FIF-CTRL1)		FIF control word 2 (FIF-CTRL2)	
Bit	**Assignment**	**Bit**	**Assignment**
1|0	**JOG values (NSET1-JOG2/3 | NSET1-JOG1/3)** 00 C0046 active 01 JOG1 (C0037) active 10 JOG2 (C0038) active 11 JOG3 (C0039) active	**0**	**Manual/Remote change-over (DCTRL1-H/Re)** 0 not active 1 active
		1	**Switch-off the integral action component of the process controller (PCTRL1-I-OFF)** 0 not active 1 active
2	**Current direction of rotation (DCTRL1-CW/CCW)** 0 not inverted 1 inverted	**2**	**Switch-off the process controller (PCTRL1-OFF)** 0 not active 1 active
3	**Quick stop (FIF-CTRL1-QSP)** 0 not active 1 active (deceleration along QSP ramp C0105)	**3**	Reserved
4	**Stop ramp function generator (NSET1-RFG1-STOP)** 0 not active 1 active	**4**	**Stop the process controller (PCTRL1-STOP)** 0 not active 1 active
5	**Ramp function generator input = 0 (NSET1-RFG1-0)** 0 not active 1 active (deceleration to C0013)	**5**	**CW rotation/quick stop (DCTRL1-CW/QSP)** 0 not active 1 active
6	**UP function of motor potentiometer (MPOT1-UP)** 0 not active 1 active	**6**	**CCW rotation/quick stop (DCTRL1-CCW/QSP)** 0 not active 1 active
7	**DOWN function of motor potentiometer (MPOT1-DOWN)** 0 not active 1 active	**7**	**X3/E1 is digital frequency input (DFIN1-ON)** 0 not active 1 active
8	Reserved	**8**	Reserved
9	**Controller inhibit (FIF-CTRL1-CINH)** 0 Controller enabled 1 Controller inhibited	**9**	Reserved
10	**External fault (FIF-CTRL1-TRIP-SET)**	**10**	Reserved
11	**Fault reset (FIF-CTRL1-TRIP-RESET)** 0 ⇒ 1 Bit change causes TRIP reset	**11**	Reserved
13|12	**Parameter set changeover (DCTRL1-PAR3/4 | DCTRL1-PAR2/4)** 00 PAR1 01 PAR2 10 PAR3 11 PAR4	**12**	Reserved
		13	Reserved
14	**DC injection brake (MTCRL1-DCB)** 0 not active 1 active	**14**	Reserved
15	Reserved	**15**	Reserved

4.5.3.2 Configure process input data

Code		Possible settings			IMPORTANT	
No.	Name	Lenze	Selection		Standardization	Parameter channel
C1510	Configuration process input data master				Assigns status information or actual values of the controller to the process data input words of the master.	
1	PIW1	18	1	FIF status word 1 (FIF-STAT1)	16 Bit	-
2	PIW2	3	2	FIF status word 2 (FIF-STAT2)	16 Bit	-
3	PIW3	4	3	Output frequency with slip (MCTRL1-NOUT+SLIP)	±24000 ≡ ±480 Hz	C0051 when C0238 = 2
4	PIW4	5	4	Output frequency without slip (MCTRL1-NOUT)	±24000 ≡ ±480 Hz	C0050
5	PIW5	6	5	Apparent motor current (MCTRL1-IMOT)	2^{14} ≡ 100 % rated controller current	C0054
6	PIW6	7	6	Act. process controller value (PCTRL1-ACT)	±24000 ≡ ±480 Hz	C0051 when C0238=0,1
			7	Process controller setpoint (PCTRL1-SET)	±24000 ≡ ±480 Hz	
			8	Process controller output (PCTRL1-OUT)	±24000 ≡ ±480 Hz	
			9	Controller load (MCTRL1-MOUT)	±2^{14} ≡ ±100 % rated motor torque	
			10	DC-bus voltage (MCTRL1-DCVOLT)	1ph: 960 ≡ DC 400 V 3ph: 975 ≡ DC 800 V	C0053
			11	Ramp function generator input (NSET1-RFG1-IN)	±24000 ≡ ±480 Hz	
			12	Ramp function generator output (NSET1-RFG1-OUT)	±24000 ≡ ±480 Hz	
			13	FIF-OUT.W1	16 bits or 0 ... 65535	
			14	FIF-OUT.W2	16 bits or 0 ... 65535	
			15	FIF-OUT.W3	0 ... 65535	
			16	FIF-OUT.W4	0 ... 65535	
			17	DRIVECOM control word (DRIVECOM-CTRL)	16 Bit	
			18	DRIVECOM status word (DRIVECOM-STAT)	16 Bit	

The bit status information or the actual values of the controllers can be freely assigned to the max. 6 process data input words (PIW) of the master.

- To call DRIVECOM conform status information assign the DRIVECOM status word to a PIW (C1511/x = 18).
  – The FIF status word 1 is mapped to the DRIVECOM status word.
- You can call enhanced status information using the FIF status words. (📖 4-19)

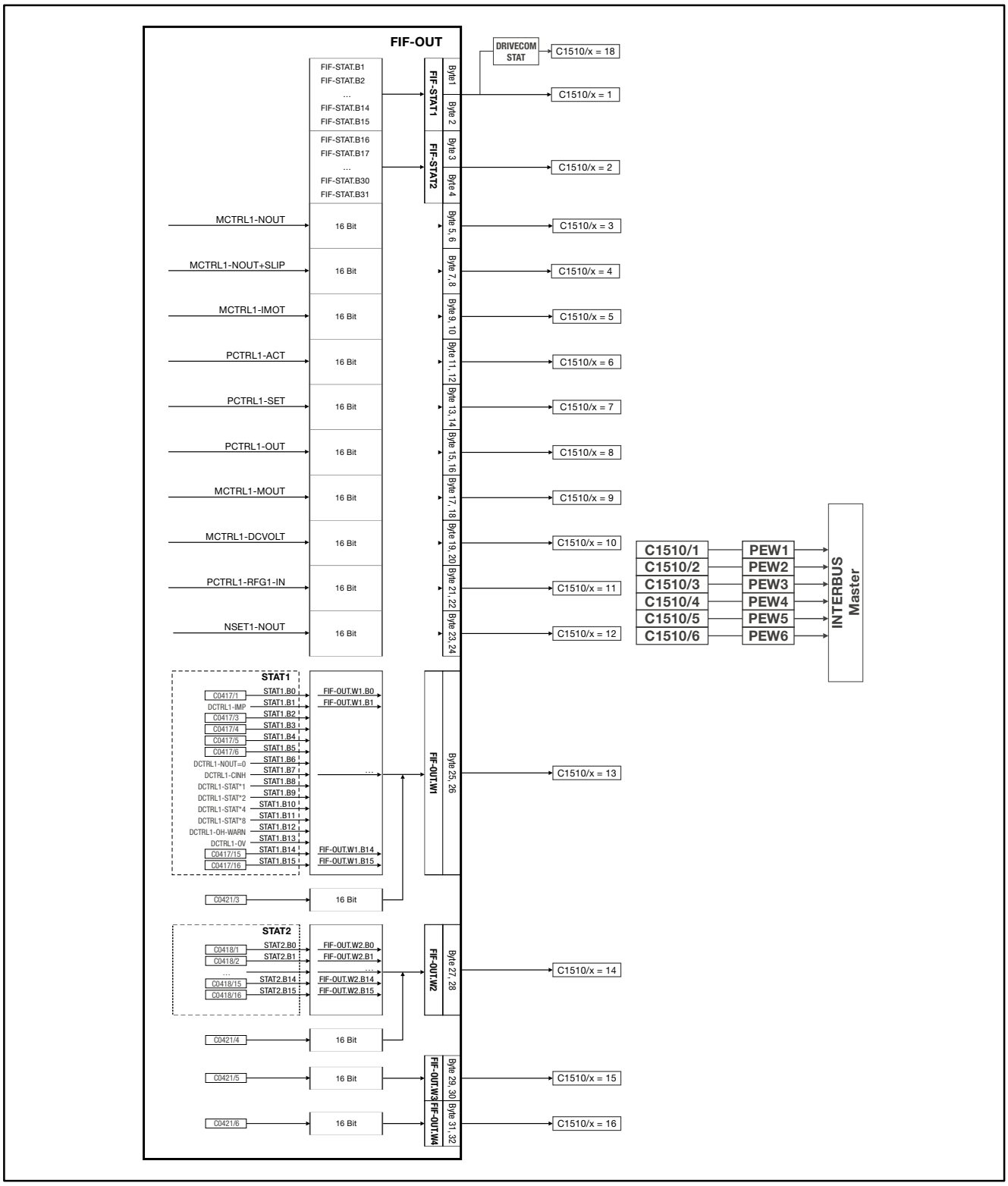
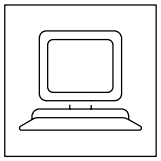


Fig. 4-4 Free configuration of the 6 process input words of INTERBUS



Parameter structure “DRIVECOM status word“ (DRIVECOM-STAT):

Bit	Meaning
0	**Controller status ”READY TO START”**
0	Status less than ”READY TO START”
1	Status at least ”READY TO START”
1	**Controller status ”SWITCHED ON”**
0	Status less than ”SWITCHED ON”
1	Status at least ”SWITCHED ON”
2	**Controller status ”OPERATION ENABLED”**
0	Status less than ”OPERATION ENABLED”
1	Status at least ”OPERATION ENABLED”
3	**Controller status ”FAULT”**
0	no fault (TRIP)
1	Fault (TRIP) occurred
4	**Status command ”Inhibit voltage”**
0	Command
1	No command
5	**Status command ”Quick stop”**
0	Command
1	No command
6	**Controller status ”SWITCH-ON INHIBIT”**
0	Status not ”SWITCH-ON INHIBIT”
1	Status ”SWITCH-ON INHIBIT”
7	**Collective warning**
0	No warning
1	Warning (overheat)
8	**Collective message** Automatic setting and resetting of pulse inhibit in the controller status ”OPERATION ENABLED”. Possible causes: Undervoltage, overvoltage or overcurrent.
0	No message
1	Message IMP active
9	Bus access authorization
1	always
10	**Status speed/change difference**
0	RFG_{on} < > HLG_{off}
1	RFG_{on} = RFG_{off}
11	**Status DRIVECOM speed limitation**
0	always
12	Mapping of FIF status word 1 (FIF-STAT1), bit 0 (DCTRL1-PAR-B0)
13	Mapping of FIF status word 2 (FIFSTAT2), bit 0 (DCTRL1-PAR-B1)
14	Mapping of FIF status word 1 (FIFSTAT1), bit 2 (MCTRL1-IMAX)
15	Mapping of FIF status word 1 (FIF-STAT1), bit 5 (PCTRL1-QMIN)

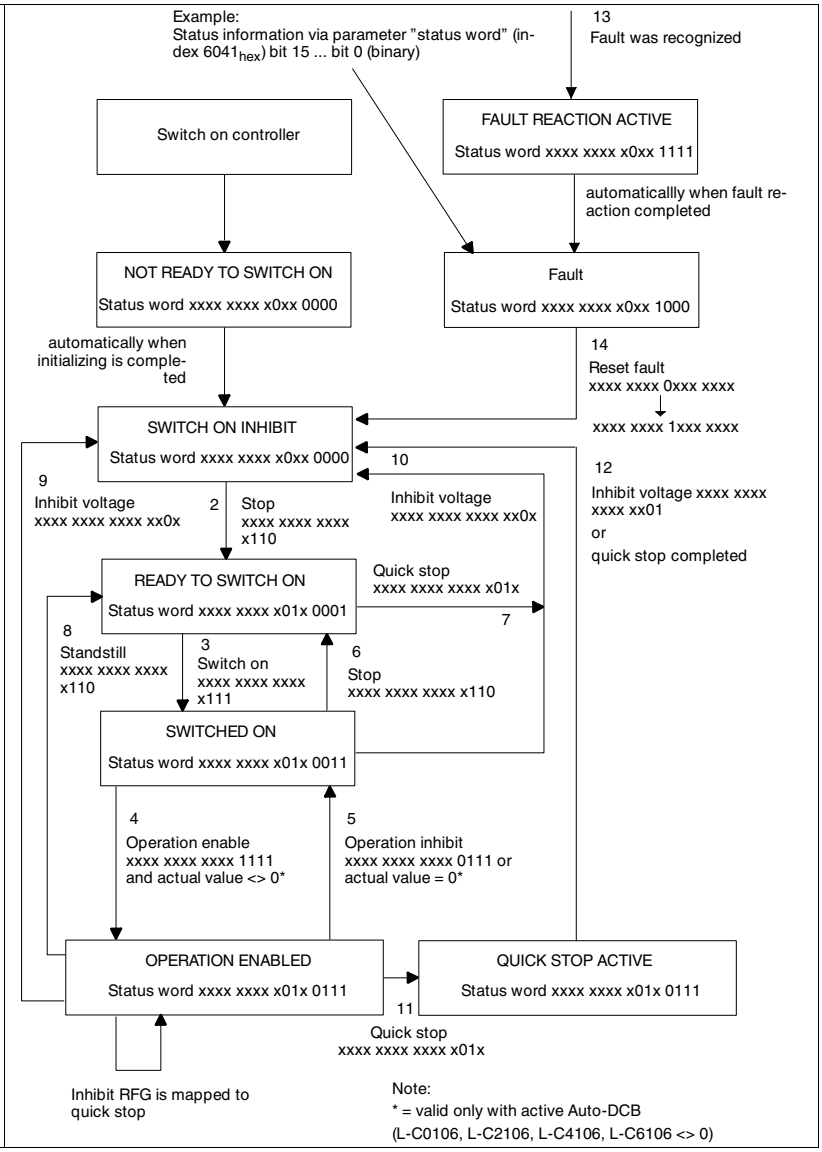
Structure of the parameter FIF status word (FIFSTATx)

FIF status word 1 (FIF-STAT1)		FIF status word 2 (FIF-STAT2)	
Bit	**Assignment**	**Bit**	**Assignment**
0	**Momentary parameter set bit 0 (DCTRL1-PAR-B0)** 0 Parameter set 1 or 3 active 1 Parameter set 2 or 4 active	**0**	**Momentary parameter set bit 1 (DCTRL1-PAR-B1)** 0 Parameter set 1 or 2 active 1 Parameter set 3 or 4 active
1	**Pulse inhibit (DCTRL1-IMP)** 0 Enable power outputs 1 Power outputs inhibited	**1**	**TRIP or Q_{min} or pulse inhibit active (DCTRL1-TRIP-QMIN-IMP)** 0 false 1 true
2	**I_{max} limit (MCTRL1-IMAX)** (If C0014 = -5-: torque setpoint) 0 not reached 1 reached	**2**	**PTC warning active (DCTRL1-PTC-WARN)** 0 false 1 true
3	**Output frequency = Frequency setpoint (DCTRL1-RFG1=NOUT)** 0 false 1 true	**3**	**C0054 < C0156 (DCTRL1-IMOT<ILIM)** 0 false 1 true
4	**Ramp function generator input 1 = ramp function generator output 1 (NSET1-RFG1-I=0)** 0 false 1 true	**4**	**C0054 < C0156 and Q_{min} threshold reached (DCTRL1-(IMOT<ILIM)-QMIN)** 0 false 1 true
5	**Q_{min} threshold (PCTRL1-QMIN)** 0 not reached 1 reached	**5**	**C0054 < C0156 and NSET1-RFG1-I=0 (DCTRL1-(IMOT<ILIM)-RFG-I=0)** 0 false 1 true
6	**Output frequency = 0 (DCTRL1-NOUT=0)** 0 false 1 true	**6**	**LP1 warning (fault in the motor phase) active (DCTRL1-LP1-WARN)** 0 false 1 true
7	**Controller inhibit (DCTRL1-CINH)** 0 Controller enabled 1 Controller inhibited	**7**	**f < f_{min} (NSET1-C0010...C0011)** 0 false 1 true
11|10|9|8	**Controller status (DCTRL1-STAT*1 ... DCTRL1-STAT*8)** 0000 Controller initialization 0001 Switch-on inhibit 0011 Operation inhibited 0100 Flying-restart circuit active 0101 DC-injection brake active 0110 Operation enabled 0111 Message active 1000 Active fault	**8**	**TRIP active (DCTRL1-TRIP)** 0 false 1 true
		9	**Motor is running (DCTRL1-RUN)** 0 false 1 true
		10	**Motor running clockwise (DCTRL1-RUN-CW)** 0 false 1 true
		11	**Motor running counterclockwise (DCTRL1-RUN-CCW)** 0 false 1 true
12	**Heat warning (DCTRL1-OH-WARN)** 0 No warning 1 ϑ_{max} - 10 °C reached	**12**	Reserved
13	**DC-bus overvoltage (DCTRL1-OV)** 0 No overvoltage 1 Overvoltage	**13**	Reserved
14	**Direction of rotation (DCTRL1-CCW)** 0 CW rotation 1 CCW rotation	**14**	**C0054 > C0156 and NSET1-RFG1-I=0 (DCTRL1-(IMOT>ILIM)-RFG-I=0)** 0 false 1 true
15	**Ready for operation (DCTRL1-RDY)** 0 Not ready for operation (fault) 1 Ready for operation (no fault)	**15**	Reserved

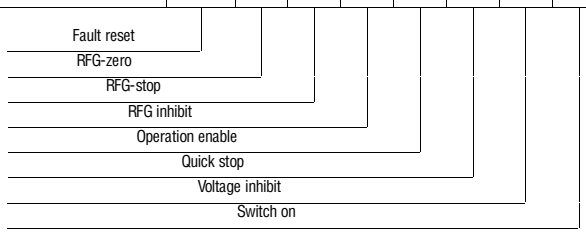
4.5.3.3 The DRIVECOM status machine

The fieldbus function module supplies the control information via the control word.

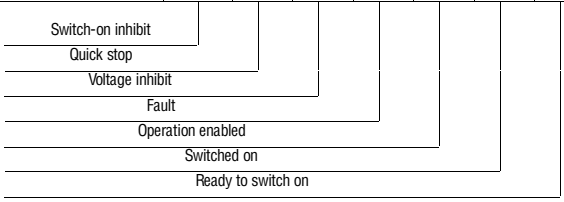
- The controllers have standardizes controller states according to DRIVECOM profile 20.
- The information about the momentary controller status are saved in the DRIVECOM parameter "Status word".
- Commands in the DRIVECOM parameter "Control word" can change the controller status. These commands are marked by arrows in the diagram.



Bit control commands		The bit control commands of the control word depend on other bit settings. The command is executed only with the following bit patterns:								
		Bits of the control word								**Note**
Command	**Meaning**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**	
Stop	From different controller states ⇨ "READY TO START"	x	x	x	x	x	1	1	**0**	1 Bit set
Switch on	Transition ⇨ "SWITCHED ON"	x	x	x	x	x	1	1	**1**	
Operation enable	Transition ⇨"OPERATION ENABLED" The controller inhibit is deactivated.	x	x	x	x	**1**	1	1	1	0 Bit not set
Inhibit operation	Transition ⇨ "SWITCHED ON" The controller inhibit is activated.	x	x	x	x	**0**	1	1	1	
Voltage inhibit	Transition ⇨ "SWITCH ON INHIBIT" The controller inhibit is activated.	x	x	x	x	x	x	**0**	x	x Any bit
Quick stop	Transition ⇨ "SWITCH ON INHIBIT" If the drive was enabled ⇨ controlled deceleration along the Lenze quick stop ramp.	x	x	x	x	x	**0**	1	x	
Fault reset	Acknowledge fault. If the fault is removed, automatically ⇨ "SWITCH ON INHIBIT"	0 ⇨1	x	x	x	x	x	x	x	



Status bits		The current controller status is unambiguously coded in bits 0 to 6 of the status word:							
		Bits of the status word							**Note**
Controller status	**Meaning**	**6**	**5**	**4**	**3**	**2**	**1**	**0**	
NOT READY TO SWITCH ON	Controller is being initialized and is not yet ready to operate. After initialization automatically ⇨ "READY TO START"	0	x	x	0	0	0	0	1 Bit set
SWITCH ON INHIBIT	Controller inhibited (CINH). Waiting for "Stop" command.	1	x	x	0	0	0	0	
READY TO SWITCH ON	Controller inhibited (CINH). Waiting for "Switch on" command.	0	1	x	0	0	0	1	0 Bit not set
SWITCHED ON	Controller inhibited (CINH). Waiting for "Enable operation" command.	0	1	x	0	0	1	1	
OPERATION ENABLED	Controller enabled ($\overline{\text{CINH}}$). Pulse inhibit can be set automatically.	0	1	x	0	1	1	1	x Any bit
FAULT REACTION ACTIVE	Fault (TRIP) was recognized, a fault response initiated. Then, automatically ⇨ "TRIP"	0	x	x	1	1	1	1	
FAULT	Controller is in the status "FAULT"	0	x	x	1	0	0	0	
QUICK STOP ACTIVE	Command "Quick stop" was sent in the controller status "Operation enabled". ⇨ Controlled deceleration along the quick stop ramp After deceleration automatically ⇨ "SWITCH ON INHIBIT"	0	0	x	0	1	1	1	



4.6 Troubleshooting and fault elimination

Two LEDs on the function module indicate the status:

	Green LED	Yellow LED
Blinking	The initialization between function module and controller has not yet been carried out.	Telegram receipt
On	Function module is connected to voltage supply, no fault.	-
Off	Function module is not connected to voltage supply.	No telegram receipt

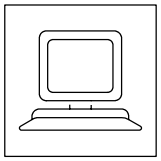
Fault	Possible cause	Remedy
INTERBUS master indicates bus error	Short circuit/Wire breakage	Check INTERBUS loop cable
	Incorrect connection of RBST	Correct the connection
Drive cannot be enabled	No enable via control word	Send $007F_{hex}$
	Controller inhibit active via terminal	X3/28 = HIGH (+12 ... +30 V)
	No setpoint entered	C0412/1 = 200 (setpoint source INTERBUS) must be set
		Assign process output data to setpoint under C1511

4.7 Code table function module INTERBUS

How to read the code table:

Column	Abbreviation		Meaning	
Code	Cxxxx		Code Cxxxx	• The parameter value of the code can be defined different for each parameter set.
	Cxxxx 1		Subcode 1 of Cxxxx	
	Cxxxx 2		Subcode 2 of Cxxxx	
	Cxxxx*		The parameter value of the code is the same in all parameter sets.	
Name			Name of the code	
Lenze			Lenze setting (value set at delivery or after overwriting of C0002 with Lenze setting).	
Selection	1 {1 %} 99		Min. value {Steps/unit} Max. value	
IMPORTANT	🕮 Page x		Brief, important explanations. Indicates where to find more detailed information.	

Code		Possible settings			IMPORTANT		
No.	Name	Lenze	Selection		Standardization	Parameter channel	
C1500	Software identification				Output as a string: 82SAFI0B_xy000		
C1502	Software identification				Output as a string in 4 parts à 4 characters		
1	Part 1						
...	...						
4	Part 4						
C1501	Software generation date				Output as a string: mmm tt jjjj hh:mm		
C1503	Software generation date				Output as a string in 4 parts à 4 characters		
1	Part 1						
...	...						
4	Part 4						
C1510	Configuration process input data master				Assigns status information or actual values of the controller to the process data input words of the master.		🕮 4-16
1	PIW1	18	1	FIF status word 1 (FIF-STAT1)	16 Bit	-	
2	PIW2	3	2	FIF status word 2 (FIF-STAT2)	16 Bit	-	
3	PIW3	4	3	Output frequency with slip (MCTRL1-NOUT+SLIP)	±24000 ≡ ±480 Hz	C0051 when C0238 = 2	
4	PIW4	5	4	Output frequency without slip (MCTRL1-NOUT)	±24000 ≡ ±480 Hz	C0050	
5	PIW5	6	5	Apparent motor current (MCTRL1-IMOT)	2^{14} ≡ 100 % rated controller current	C0054	
6	PIW6	7	6	Act. process controller value (PCTRL1-ACT)	±24000 ≡ ±480 Hz	C0051 when C0238=0,1	
			7	Process controller setpoint (PCTRL1-SET1)	±24000 ≡ ±480 Hz		
			8	Process controller output (PCTRL1-OUT)	±24000 ≡ ±480 Hz		
			9	Controller load (MCTRL1-MOUT)	$\pm 2^{14}$ ≡ ±100 % rated motor torque		
			10	DC-bus voltage (MCTRL1-DCVOLT)	1ph: 960 ≡ DC 400 V 3ph: 975 ≡ DC 800 V	C0053	
			11	Ramp function generator input (NSET1-RFG1-IN)	±24000 ≡ ±480 Hz		
			12	Ramp function generator output (NSET1-RFG1-OUT)	±24000 ≡ ±480 Hz		
			13	FIF-OUT.W1	16 bit or 0 ... 65535		
			14	FIF-OUT.W2	16 bit or 0 ... 65535		
			15	FIF-OUT.W3	0 ... 65535		
			16	FIF-OUT.W4	0 ... 65535		
			17	DRIVECOM control word (DRIVECOM-CTRL)	16 Bit		
			18	DRIVECOM status word (DRIVECOM-STAT)	16 Bit		

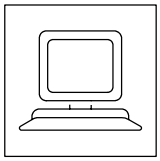


Automation

INTERBUS

Code		Possible settings			IMPORTANT		
No.	Name	Lenze	Selection		Standardization	Parameter channel	
C1511	Configuration process output data master				Assigns process data output words of the master to bit control commands or setpoints of the controller. **Modification of C1511 automatically inhibits process output data to ensure data consistency.** Enable again under C1512.		📖 4-12
1	POW1	17	1	FIF control word 1 (FIF-CTRL1)	16 Bit	-	
2	POW2	3	2	FIF control word 2 (FIF-CTRL2)	16 Bit	-	
3	POW3	4	3	Setpoint 1 (NSET1-N1)	±24000 ≡ ±480 Hz	C0046	
4	POW4	5	4	Setpoint 2 (NSET1-N2)	±24000 ≡ ±480 Hz	C0044	
5	POW5	6	5	Additional setpoint (PCTRL1-NADD)	±24000 ≡ ±480 Hz	C0049	
6	POW6	7	6	Act. process controller value (PCTRL1-ACT)	±24000 ≡ ±480 Hz	C0051 when C0238=1,2	
			7	Process controller setpoint (PCTRL1-SET)	±24000 ≡ ±480 Hz	C0138	
			8	Reserved			
			9	Torque setpoint or torque limit value (MCTRL1-MSET)	2^{14} ≡ 100 % rated motor torque	C0047	
			10	PWM voltage (MCTRL1-VOLT-ADD)	**Only for special applications. Modifications only when agreed on by Lenze!**		
			11	PWM phase (MCTRL1-PHI-ADD)			
			12	Reserved			
			13	FIF-IN.W1	16 bits or 0 ... 65535		
			14	FIF-IN.W2	16 bits or 0 ... 65535		
			15	FIF-IN.W3	0 ... 65535		
			16	FIF-IN.W4	0 ... 65535		
			17	DRIVECOM control word (DRIVECOM-CTRL)	16 Bit		
C1512	Enable process output data		0 {1} 255 255 = enable all		The decimal value of the bit settings enables any combinations of the process output words. • 0 = Inhibit output word • 1 = Enable output word		📖 4-12
			POW6 2^5	POW5 2^4 POW4 2^3 POW3 2^2 POW2 2^1 POW1 2^0			
C1513	Response monitoring time PCD communication	65535	0	{1 ms} 65534 65535 = switched off	When the master does not send a message within the response monitoring time, the action set under C1514 is performed.		
C1514	Action in case of PCD communication error	0	0	No action			
			-1-	TRIP (fault)			
			-2-	CINH (controller inhibit)			
			-3-	QSP (quick stop)			
C1515	Process data specification		0 ... 6	as DIP switch	Change process data specification using software switches. C1515 is active only when the DIP switch on the front side of the module is set as follows: 4 = ON, 3 = ON, 2 = ON. Modification will be effective only after mains connection.		📖 4-7
			11 ... 16	1 ... 6 words PCD, no PCP 11 (1 word PCD) ... 16 (6 words PCD)			
			21 ... 25	1 ... 5 words PCD, 1 word PCP 21 (1 word PCD) ... 25 (5 words PCD)			

Code		Possible settings				IMPORTANT		
No.	Name	Lenze	Selection			Standardization	Parameter channel	
C1520	All words to the master		0	{1}	65535	display only		
1	PIW1							
...	...							
10	PIW10							
C1521	All words from the master							
1	POW1							
...	...							
10	POW10							
C1522	All words to the controller							
1	FIF-IN, word 1 ...word 16							
...								
16								
C1523	All words from the controller							
1	FIF-OUT, word 1 ...word 16							
...								
16								
C1525	Setting of DIP switch		0	{1}	7	Output of decimal value of the settings of switches 4, 3 and 2. 0 = OFF 1 = ON		
C1530	Diagnostics					always 0		
C1531	Bus states					Output of bus states		
1	Counter 1		Data cycles per seconds			Counters count up to 65535 and then restart at zero.		
2	Counter 2		Total data cycles					
3	Counter 3		Total INTERBUS resets					
4	Counter 4		Total ID cycles					



5 Function module LECOM-B (RS485)

5.1 Description

The function module LECOM-B (RS485) is a component for the frequency inverters 8200 motec and 8200 vector, which connects the controllers to a higher-level host (PLC or PC) via the Lenze fieldbus LECOM-B (RS485).

The controllers can also be retrofitted.

5.2 Technical data

Communication medium	RS485 (LECOM-B)
Communication protocol	LECOM-A/B V2.0
Character format	7E1: 7 bit ASCII, 1 stop bit, 1 start bit, 1 parity bit (even)
Baud rate [Bit/s]	1200, 2400, 4800, 9600, 19200, 38400, 57600
LECOM-B device	Slave
Network topology	without repeater: line with repeater: line or tree
Process data words (PCD) (16 Bit)	2 words
Max. number of devices	31 (= 1 bus segment) with repeaters: 90
Max. cable length per bus segment	1000 m (depending on the baud rate and cable type used)
Communication time	See table
Electrical connection	Screw terminals Terminal for controller inhibit (CINH) available
DC supply voltage	• Internal • External, necessary – for bus devices which are disconnected from the mains, but their communication to the mains is to be maintained. – for bus devices with activated bus terminating resistor which are disconnected from the mains, but the bus system is to remain active. – Supply via separate switch mode power supply – +24 V DC ±10 %, max. 70 mA
Insulation voltage to PE	50 V AC
Type of protection	IP20
Ambient temperature	during operation: -10 ... +60 °C Transport: -25 ... +60 °C Storage: -25 ... +60 °C
Climatic conditions	Class 3K3 to EN 50178 (without condensation, average relative humidity 85 %)
Dimensions (L x W x H)	65 mm x 50 mm x 23 mm

Communication times								
Telegram time t2 + t4 [ms]		**Baud rate [bit/s]**						
		1200	**2400**	**4800**	**9600**	**19200**	**38400**	**57600**
Telegram type SEND (Send data to drive)	$t2_{Standard}$ (Parameter value = 9 digits)	150	75	37.5	18.8	9.4	4.7	3.1
	In addition for extended addressing	41.6	20.8	10.4	5.2	2.6	1.3	0.9
Telegram type RECEIVE (Read data from drive)	$t4_{Standard}$ (Parameter value = 9 digits)	166.7	83.3	41.7	20.8	10.4	5.2	3.5
	In addition for extended addressing	83.3	41.7	20.8	10.4	5.2	2.6	1.7
Time required for single digit [1]	per digit [ms]	8.4	4.2	2.1	1	0.52	0.26	0.17

Processing time in the controller (t3)		**t3 [ms]**
Code	C0046, C0135	20
	C0068	30
	write other codes	20 [2]
	read other codes	20

1) If a telegram has less ore more than 9 characters, the transmission time changes accordingly.
2) For immediately following write-access procedures, the response times may be up to 50ms.

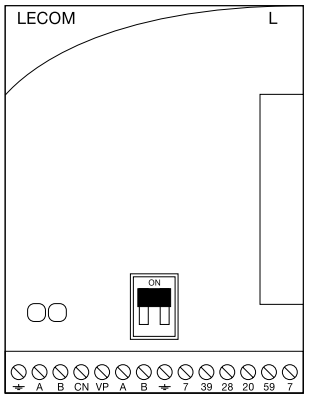
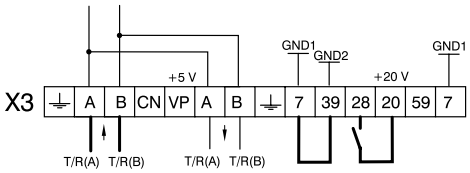
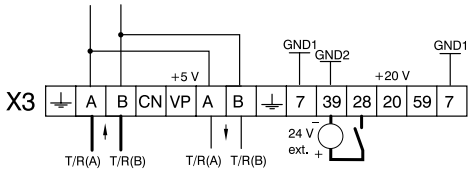
5.3 Installation

5.3.1 Mechanical installation

See Instructions of the function module

5.3.2 Electrical installation

5.3.2.1 Terminal assignment

Front view	Supply of terminal "Controller inhibit (CINH)" via internal voltage source X3/20 (+20 V DC)	Supply of terminal "Controller inhibit (CINH)" via external voltage source + 24 V DC (+12 V DC - 0 % ... +30 V DC + 0 %)
		
		The min. wiring requirements for operation

X3/	Input (I) / output (O)	Explanation	
59	I	External DC supply, reference X3/7	Cable diameter: max. 1 mm² (AWG18) Tightening torque: 0.5 ... 0.6 Nm (4.4 ... 5.3 lbin)
7	-	GND1, reference potential 1	
39	-	GND2, reference potential for X3/28 (CINH)	
⊥	-	PES, additional HF screen connection	
A	I/O	T/R(A), RS485 data line A	
B	I/O	T/R(B), RS485 data line B	
CN	A	CNTR, CNTR = HIGH (+5 V) during data transmission	
VP	A	+5 V (10 mA load)	
28	I	Controller inhibit (CINH) • Start = HIGH (+12 V ... +30 V) • Stop = LOW (0 ... +3 V)	
20	A	+20 V internal for CINH, reference: X3/7	
DIP switch			
	DIP switch = ON	Integrated bus terminating resistor active	
	DIP switch = OFF	Integrated bus terminating resistor inactive	

Fig. 5-1 Terminal assignment of function module LECOM-B (RS485)

Tip!

The bus system must be terminated at the physically first and last bus device (master or slave)!

5.3.2.2 Wiring with a host (PC or PLC)

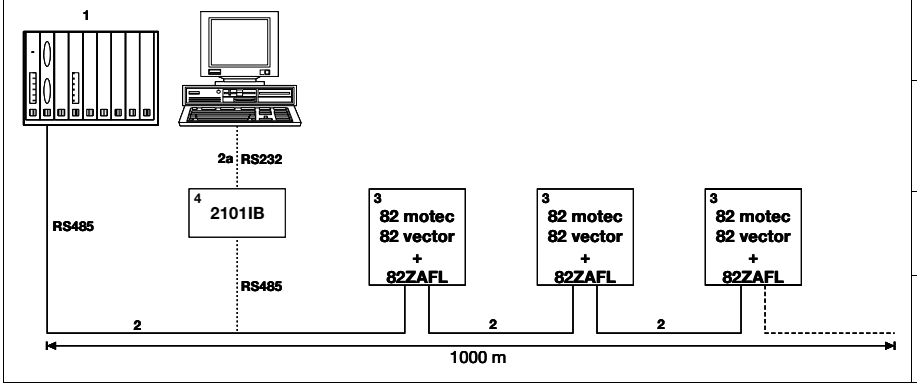
Basic structure	Specification bus cable		
	**Total length**	**≤ 300 m**	**≤ 1000 m**
	Cable type	LIYCY 1 x 2 x 0.5 mm² shielded	CYPIMF 1 x 2 x 0.5 mm² shielded
	Cable resistance	≤ 40 Ω/km	≤ 40 Ω/km
	Capacitance per unit length	≤ 130 nF/km	≤ 60 nF/km

Fig. 5-2 Basic structure of a LECOM-B network without repeaters

Elements of the LECOM-B network		
No.	**Element**	**Note**
1	Host	e.g. PC or PLC with RS485 master interface module or RS232 interface module
2	RS485 bus cable	max. 1000 m
2a	PC system cable	Connects PC/PLC with RS232 interface to the interface converter 2101IB
3	Lecom-B slave	Lenze controller with function module LECOM-B (RS485) (82ZAFL)
4	2101IB interface converter	Level converter with mains isolation to convert between RS232 and RS485/RS422

Tip!

- The controller has a double basic insulation to VDE 0160. An additional mains insulation is not required.
- Use Lenze accessories for wiring.

Host accessories	Name	Order no.	Explanation
Software	Global Drive Control (GDC)		PC program for drive programming; system requirements: IBM AT compatible
	LECOM-PC	-	LECOM-A/B communication driver for PC systems in C/C++ (source code). Easy modification for other target systems.
	B&R, Mitsubishi, Schleicher, Sigmatek, Cotas, AMS	-	Drivers for various PLC systems. Further information on request.
Hardware	Interface converter 2101IB	33.2101IB	Level converter between RS232 and RS485/RS422 with electrical isolation
	PC system cable 5 m	EW00338094	System cable between PC (9-pole female connector) and 2101IB interface converter

5.4 Commissioning of function module

Stop!

- Prior to connecting the mains voltage, check
  – the entire wiring for completeness, earth fault and short circuit.
  – whether the bus system is terminated at the physically first and last bus device.
- **Keep to the switch-on sequence!**

5.4.1 Initial switch-on

Step	Lenze setting	Note
1. Connect mains voltage of the controller and, if necessary, the external supply of the function module.		The green LED on the function module is illuminated (visible only on 8200 vector).
2. For the first and last bus device only: – DIP switch = ON (📖 5-2)	OFF	activate bus terminating resistor.
3. Assign a station address to every bus device via keypad or master system under C1509.	1	Every bus device has another address. (📖 5-5)
4. Set LECOM baud rate under C1516 via keypad or master system.	9600 Bit/s	
5. You can communicate now with the controller.		The yellow LED is flashing when the LECOM-B is active.
6. If necessary, adapt the codes to your application.		See Operating Instructions of the controller
7. Configure setpoint source: C0412/1 = 0		C0046 is setpoint source
8. Select setpoint under C0046.		
9. Enable controller via terminal.		X3/28 = HIGH
10. The drive is now running.		

Tip!

When you set the station address (C1509) and the LECOM baud rate (C1516) in step 3 and 4 via the master system, you must change the settings of the host immediately. The host would not recognize the responses, since these are sent with the new settings from the controller.

5.5 Set up LECOM-B communication

The function module LECOM-B (RS485) provides two communication channels for the control and parameterization of the bus devices.

Data	Communication channel used
Parameters	**Parameter channel** • Enables the access to all Lenze codes. • Parameter changes are normally saved in the controller (observe C0003).
LECOM process data	**LECOM process data channel** • You can control and parameterize the bus device using two "quasi process data words" under C1517. (📖 5-7) • LECOM process data are not saved in the controller.

5.5.1 Configure parameter channel

The LECOM-B parameter channel enables the access to all Lenze codes.

- Controller codes (see code table of the controllers).
  – These codes are automatically stored as non-volatile data. Process data, for instance control words or setpoints are excluded.
- Module-specific codes, which can only be accessed when the function module is active. (📖 5-14)

5.5.1.1 Access to parameters

The codes of the four parameter sets of the controllers can be addressed directly via offsets:

Offset	Parameter set	Example: Address of C0011	Important
0	1	11	Always use offset 0 for codes which have the same value in all parameter sets! (Marked with "*" in the code tables of the controllers)
2000	2	2011	
4000	3	4011	
6000	4	6011	

5.5.1.2 Addressing of the bus devices (station address)

For the unambiguous controller addressing, set the LECOM station address in C1509.

Station address (C1509)			Important
Individual addresses	Possible values 0 ... 99 Must only be **used once in** the bus system.		Do not set the values 00, 10, 20 ..., 90, since they are reserved for group addressing.
Group addresses Group addresses are used to send a write job to several controllers at the same time, for instance to provide new setpoints or controller inhibit.	**Write job to address**	**Requested individual LECOM addresses**	When group addressing is used, the controller does not send a receipt acknowledgement! This means that the master does not recognize whether the data were received correctly.
	00	all	
	10	11 ... 19	
	20	21 ... 29	
	30	31 ... 39	
	40	41 ... 49	
	50	51 ... 59	
	60	61 ... 69	
	70	71 ... 79	
	80	81 ... 89	
	90	91 ... 99	

5.5.1.3 LECOM-B operating state

The parameter LECOM-B operating state supplies status information on the controller and the LECOM-B system.

Structure of the parameter "LECOM-B operating state" (C0068)

LECOM-B operating state (C0068)	
Bit	**Assignment**
3|2|1|0	**Operating fault (TRIP)** Submission of the 10th digit of the LECOM fault number. Example: TRIP OH (LECOM-No. 50) = 0110 (5)
7|6|5|4	**Last communication error**
0000	No fault
0001	Check sum error
0010	Protocol frame error
0011	Reserved
0100	Invalid code number
0101	Invalid variable
0110	No access permission
0111	Telegram processing interrupted by new telegram
1111	General fault
8	**CINH (controller inhibit)**
0	Controller enabled
1	Controller inhibited
9	**Q_{min}threshold**
0	not reached
1	reached
10	**Direction of rotation**
0	CW rotation
1	CCW rotation
11	**IMP (pulse inhibit)**
0	Power stages inhibited
1	Power stages enabled
12	**QSP (quick stop)**
0	QSP not active
1	QSP active
13	**I_{max}limit** (If C0014 = -5-: torque setpoint)
0	not reached
1	reached
14	**Output frequency = Frequency setpoint**
0	false
1	true
15	**Ready for operation**
0	Not ready for operation (fault)
1	Ready for operation (no fault)

5.5.2 Configure LECOM process data

LECOM-B provides two "quasi process data words" with 16 bit each under coder C1517. They can be assigned freely to the process data words of the controller. Make the assignments in codes C1511 (process output data) and C1510 (process input data).

From the position of the master:

- The master sends process output data in max. 2 process data output words (POW) to the slaves.
- The master receives process input data in max. 2 process data input words (PIW) from the slaves.

5.5.2.1 Configure process output data

Code		Possible settings			IMPORTANT	
No.	Name	Lenze	Selection		Standardisation	Parameter channel
C1511	Configuration process output data master				Assigns LECOM process output data of the master to bit control commands or setpoints of the controller.	
1	POW1 (C1517, bit 0 ... bit 15)	1	1	FIF control word 1 (FIF-CTRL1)	16 Bit	-
2	POW2 (C1517, bit 16 ... bit 31)	3	2	FIF control word 2 (FIF-CTRL2)	16 Bit	-
			3	Setpoint 1 (NSET1-N1)	±24000 ≡ ±480 Hz	C0046
			4	Setpoint 2 (NSET1-N2)	±24000 ≡ ±480 Hz	C0044
			5	Additional setpoint (PCTRL1-NADD)	±24000 ≡ ±480 Hz	C0049
			j6	Act. process controller value (PCTRL1-ACT)	±24000 ≡ ±480 Hz	C0051 when C0238 = 1, 2
			7	Process controller setpoint (PCTRL1-SET)	±24000 ≡ ±480 Hz	C0138
			8	Reserved		
			9	Torque setpoint or torque limit value (MCTRL1-MSET)	2^{14} ≡ 100 % rated motor torque	C0047
			10	PWM voltage (MCTRL1-VOLT-ADD)	**Only for special applications. Modifications only when agreed on by Lenze!**	
			11	PWM phase (MCTRL1-PHI-ADD)		
			12	Reserved		
			13	FIF-IN.W1	16 Bit or 0 ... 65535	
			14	FIF-IN.W2	16 Bit or 0 ... 65535	
			15	FIF-IN.W3	0 ... 65535	
			16	FIF-IN.W4	0 ... 65535	

Automation

LECOM-B (RS485)

The assignment of the quasi process data output words (POW) of the master can be freely configured to bit control commands or setpoints of the controller:

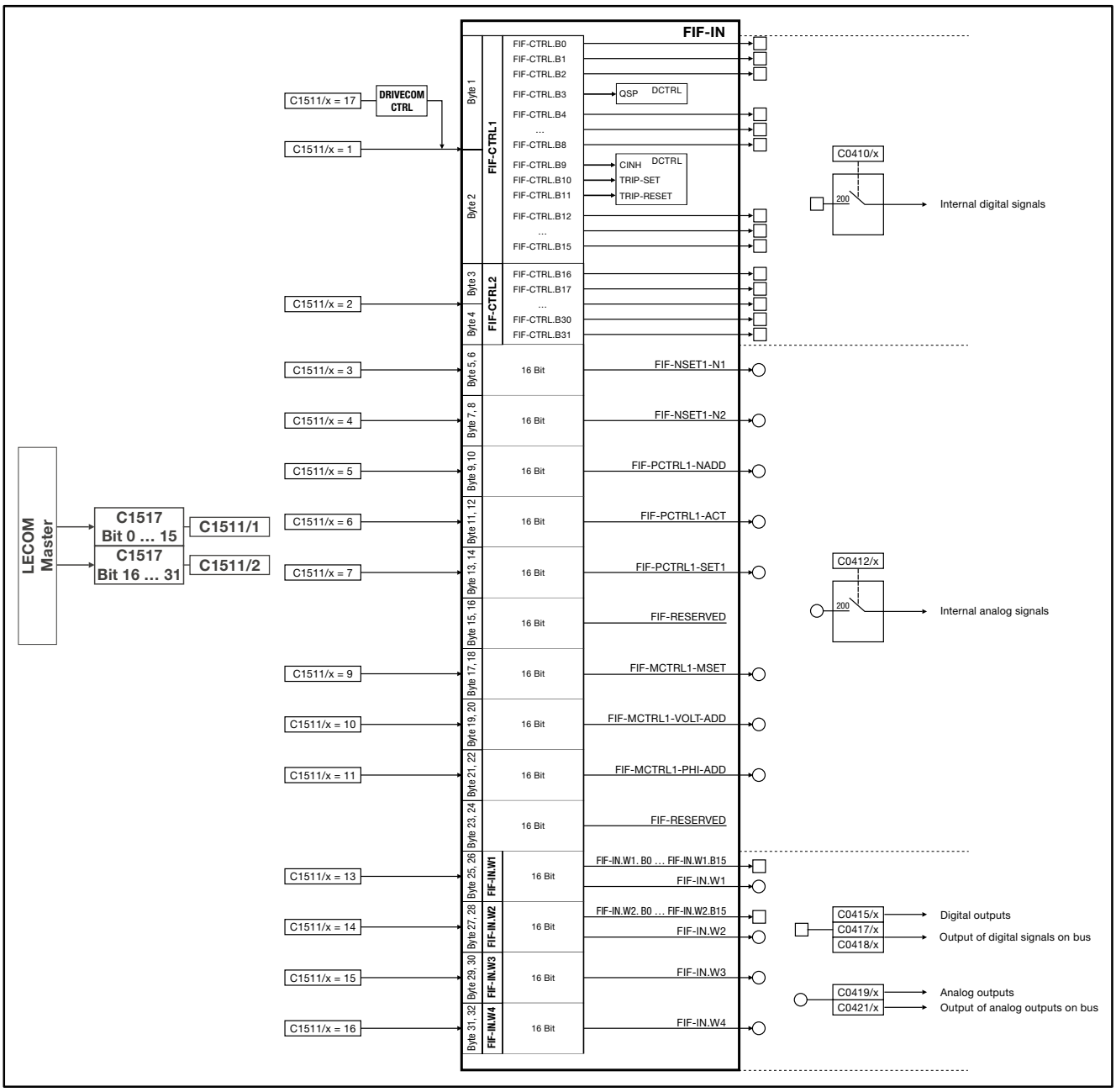


Fig. 5-3 Free configuration of the LECOM-B process output data

Structure of parameter FIF control word (FIF-CTRLx)

FIF control word 1 (FIF-CTRL1)		FIF control word 2 (FIF-CTRL2)	
Bit	**Assignment**	**Bit**	**Assignment**
1|0	**JOG values (NSET1-JOG2/3 | NSET1-JOG1/3)** 00 C0046 active 01 JOG1 (C0037) active 10 JOG2 (C0038) active 11 JOG3 (C0039) active	**0**	**Manual/Remote change-over (DCTRL1-H/Re)** 0 not active 1 active
		1	**Switch-off the integral action component of the process controller (PCTRL1-I-OFF)** 0 not active 1 active
2	**Current direction of rotation (DCTRL1-CW/CCW)** 0 not inverted 1 inverted	**2**	**Switch-off the process controller (PCTRL1-OFF)** 0 not active 1 active
3	**Quick stop (FIF-CTRL1-QSP)** 0 not active 1 active (deceleration along QSP ramp C0105)	**3**	Reserved
4	**Stop ramp function generator (NSET1-RFG1-STOP)** 0 not active 1 active	**4**	**Stop the process controller (PCTRL1-STOP)** 0 not active 1 active
5	**Ramp function generator input = 0 (NSET1-RFG1-0)** 0 not active 1 active (deceleration to C0013)	**5**	**CW rotation/quick stop (DCTRL1-CW/QSP)** 0 not active 1 active
j6	**UP function of motor potentiometer (MPOT1-UP)** 0 not active 1 active	**j6**	**CCW rotation/quick stop (DCTRL1-CCW/QSP)** 0 not active 1 active
7	**DOWN function of motor potentiometer (MPOT1-DOWN)** 0 not active 1 active	**7**	**X3/E1 is digital frequency input (DFIN1-ON)** 0 not active 1 active
8	Reserved	**8**	Reserved
9	**Controller inhibit (FIF-CTRL1-CINH)** 0 Controller enabled 1 Controller inhibited	**9**	Reserved
10	**External fault (FIF-CTRL1-TRIP-SET)**	**10**	Reserved
11	**Fault reset (FIF-CTRL1-TRIP-RESET)** 0 ⇒ 1 Bit change causes TRIP reset	**11**	Reserved
13|12	**Parameter set changeover (DCTRL1-PAR3/4 | DCTRL1-PAR2/4)** 00 PAR1 01 PAR2 10 PAR3 11 PAR4	**12**	Reserved
		13	Reserved
14	**DC injection brake (MTCRL1-DCB)** 0 not active 1 active	**14**	Reserved
15	Reserved	**15**	Reserved

5.5.2.2 Configure process input data

Code		Possible settings			IMPORTANT	
No.	Name	Lenze	Selection		Standardization	Parameter channel
C1510	Configuration process input data master				Assigns status information or actual values of the controller to the process data input words of the master.	
1	PIW1 (C1517, bit 0 ... bit 15)	1	1	FIF status word 1 (FIF-STAT1)	16 Bit	-
2	PIW2 (C1517, bit 16 ... bit 31)	3	2	FIF status word 2 (FIF-STAT2)	16 Bit	-
			3	Output frequency with slip (MCTRL1-NOUT+SLIP)	±24000 ≡ ±480 Hz	C0051 when C0238 = 2
			4	Output frequency without slip (MCTRL1-NOUT)	±24000 ≡ ±480 Hz	C0050
			5	Apparent motor current (MCTRL1-IMOT)	2^{14} ≡ 100 % rated controller current	C0054
			j6	Act. process controller value (PCTRL1-ACT)	±24000 ≡ ±480 Hz	C0051 when C0238 = 0, 1
			7	Process controller setpoint (PCTRL1-SET1)	±24000 ≡ ±480 Hz	
			8	Process controller output (PCTRL1-OUT)	±24000 ≡ ±480 Hz	
			9	Controller load (MCTRL1-MOUT)	±2^{14} ≡ ±100 % rated motor torque	
			10	DC-bus voltage (MCTRL1-DCVOLT)	1ph: 960 ≡ DC 400 V 3ph: 975 ≡ DC 800 V	C0053
			11	Ramp function generator input (NSET1-RFG1-IN)	±24000 ≡ ±480 Hz	
			12	Ramp function generator output (NSET1-RFG1-OUT)	±24000 ≡ ±480 Hz	
			13	FIF-OUT.W1	16 Bit or 0 ... 65535	
			14	FIF-OUT.W2	16 Bit or 0 ... 65535	
			15	FIF-OUT.W3	0 ... 65535	
			16	FIF-OUT.W4	0 ... 65535	

The bit status information or the actual values of the controller can be freely assigned to the quasi process data input words (PIW) of the master.

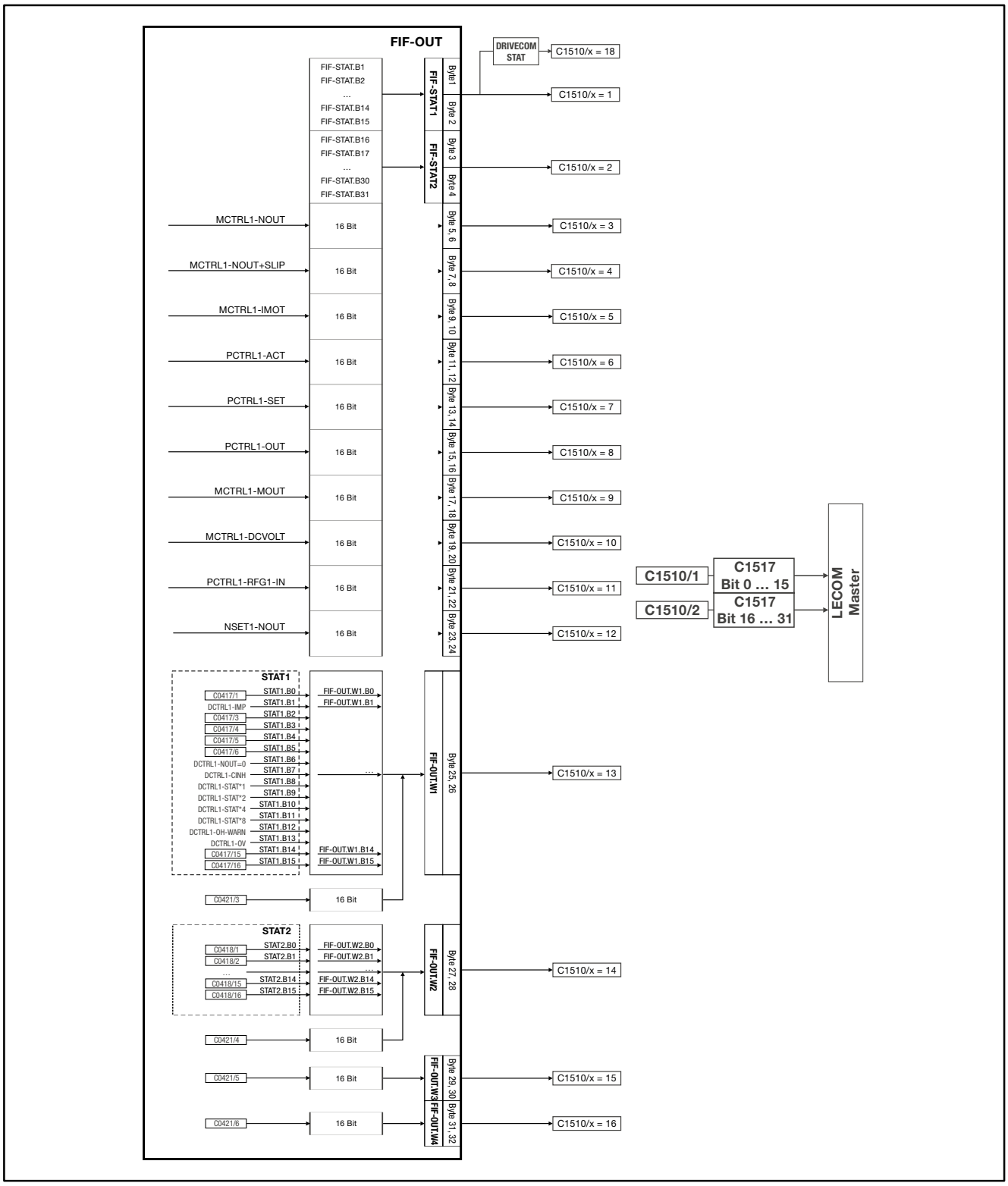
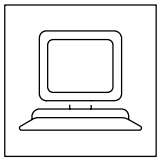


Fig. 5-4 Free configuration of the LECOM-B process input data



Structure of the parameter FIF status word (FIF-STATx)

FIF status word 1 (FIF-STAT1)		FIF status word 2 (FIF-STAT2)	
Bit	**Assignment**	**Bit**	**Assignment**
0	**Momentary parameter set bit 0 (DCTRL1-PAR-B0)** 0 Parameter set 1 or 3 active 1 Parameter set 2 or 4 active	**0**	**Momentary parameter set bit 1 (DCTRL1-PAR-B1)** 0 Parameter set 1 or 2 active 1 Parameter set 3 or 4 active
1	**Pulse inhibit (DCTRL1-IMP)** 0 Enable power outputs 1 Power outputs inhibited	**1**	**TRIP or Q_{min} or pulse inhibit active (DCTRL1-TRIP-QMIN-IMP)** 0 false 1 true
2	**I_{max} limit (MCTRL1-IMAX)** (If C0014 = -5-: torque setpoint) 0 not reached 1 reached	**2**	**PTC warning active (DCTRL1-PTC-WARN)** 0 false 1 true
3	**Output frequency = Frequency setpoint (DCTRL1-RFG1=NOUT)** 0 false 1 true	**3**	**C0054 < C0156 (DCTRL1-IMOT<ILIM)** 0 false 1 true
4	**Ramp function generator input 1 = ramp function generator output 1 (NSET1-RFG1-I=0)** 0 false 1 true	**4**	**C0054 < C0156 and Q_{min} threshold reached (DCTRL1-(IMOT<ILIM)-QMIN)** 0 false 1 true
5	**Q_{min} threshold (PCTRL1-QMIN)** 0 not reached 1 reached	**5**	**C0054 < C0156 and NSET1-RFG1-I=0 (DCTRL1-(IMOT<ILIM)-RFG-I=0)** 0 false 1 true
j6	**Output frequency = 0 (DCTRL1-NOUT=0)** 0 false 1 true	**j6**	**LP1 warning (fault in the motor phase) active (DCTRL1-LP1-WARN)** 0 false 1 true
7	**Controller inhibit (DCTRL1-CINH)** 0 Controller enabled 1 Controller inhibited	**7**	**f < f_{min} (NSET1-C0010...C0011)** 0 false 1 true
11|10|9|8	**Controller status (DCTRL1-STAT*1 ... DCTRL1-STAT*8)** 0000 Controller initialization 0001 Switch-on inhibit 0011 Operation inhibited 0100 Flying-restart circuit active 0101 DC-injection brake active 0110 Operation enabled 0111 Message active 1000 Active fault	**8**	**TRIP active (DCTRL1-TRIP)** 0 false 1 true
		9	**Motor is running (DCTRL1-RUN)** 0 false 1 true
		10	**Motor running clockwise (DCTRL1-RUN-CW)** 0 false 1 true
		11	**Motor running counterclockwise (DCTRL1-RUN-CCW)** 0 false 1 true
12	**Heat warning (DCTRL1-OH-WARN)** 0 No warning 1 ϑ_{max} - 10 °C reached	**12**	Reserved
13	**DC-bus overvoltage (DCTRL1-OV)** 0 No overvoltage 1 Overvoltage	**13**	Reserved
14	**Direction of rotation (DCTRL1-CCW)** 0 CW rotation 1 CCW rotation	**14**	**C0054 > C0156 and NSET1-RFG1-I=0 (DCTRL1-(IMOT>ILIM)-RFG-I=0)** 0 false 1 true
15	**Ready for operation (DCTRL1-RDY)** 0 Not ready for operation (fault) 1 Ready for operation (no fault)	**15**	Reserved

5.6 Troubleshooting and fault elimination

Two LEDs on the function module indicate the status:

	Green LED	Yellow LED
Blinking	The initialization between function module and controller has not yet been carried out.	Telegram receipt
On	Function module is connected to voltage supply, no fault.	-
Off	Function module is not connected to voltage supply.	No telegram receipt

Fault	Cause	Remedy
No communication with the controller.	Controller is switched off. None of the operating displays of the controller is on.	Controller is connected to voltage supply.
	Function module has not initialized with the controller.	Check plug conection of the function module.
Controller does not execute write job	• Controller sends negative acknowledgement (NAK response):	
	– No write access to C0046, because C0412 is set wrongly.	Set C0412/1 = 0.
	– Attempt to write in a code type “read only”.	In general, write job not possible.
	• Controller sends positive acknowledgement(ACK response): – Controller uses a different parameter set	Change over parameter set; the parameter change will be active.
LECOM-B master indicates “Timeout”	• Short circuit/Wire breakage • Incorrect station address • Incorrect baud rate	Check wiring Set C1509 correctly (📖 5-5) Set baud rate (C1516) of the master and the slaves to the same value.
	• Incorect transmission direction change-over in the level converter 2101IB	
Drive cannot be enabled	• No enable via control word • X3/28 (controller inhibit) = LOW • No setpoint entered	Check control word X3/28 = HIGH Set C412/1 = 200 to activate setpoint input via function module

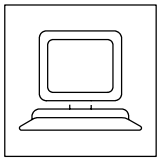
5.7 Code table function module LECOM-B (RS485)

How to read the code table:

Column	Abbreviation		Meaning	
Code	Cxxxx		Code Cxxxx	• The parameter value of the code can be defined different for each parameter set.
	Cxxxx 1		Subcode 1 of Cxxxx	
	Cxxxx 2		Subcode 2 of Cxxxx	
	Cxxxx*		The parameter value of the code is the same in all parameter sets.	
Name			Name of the code	
Lenze			Lenze setting (value set at delivery or after overwriting of C0002 with Lenze setting).	
Selection	1 {1 %} 99		Min. value {Steps/unit} Max. value	
IMPORTANT	🕮 Page x		Brief, important explanations. Indicates where to find more detailed information.	

Code		Possible settings		IMPORTANT	
No.	Name	Lenze	Selection	Standardization / Parameter channel	
C0068	LECOM operating state			Important status information via the controller and LECOM-B	🕮 5-6
C1500	Software identification			Output as a string: 82SAFL0B_xy000	
C1502	Software identification			Output as a string in 4 parts à 4 characters	
1	Part 1				
...	...				
4	Part 4				
C1501	Software generation date			Output as a string: mmm tt jjjj hh:mm	
C1503	Software generation date			Output as a string in 4 parts à 4 characters	
1	Part 1				
...	...				
4	Part 4				
C1507	LECOM-B selection subcode	0	0 {1} 255	• Serves the compatibility with LECOM-A/B master system drivers V1.0 which do not allow the addressing of codes with subcodes (array parameters). • C1507 determines the subcode (array element) to be accessed. • C1507 is also valid for access to codes without subcode. C1507 = 0 causes an error since the address does not exist. • LECOM A/B drivers as of version V2.0 enable the direct addressing of subcodes. Do not use C0248 together with these drivers. • C1507 is set to 0 after every mains connection.	
C1508	LECOM-B code bank addressing	0	0 0 ... 255 1 250 ... 505 2 500 ... 755 3 750 ... 1005 4 1000 ... 1255 5 1250 ... 1505 j6 1500 ... 1755 7 1750 ... 2005 ... ... 31 7750 ... 8005	• For compatibility with LECOM-A/B master system drivers V1.0 (largest possible code number 255). • With the code bank, an offset of 250 is added to the code number. • LECOM A/B drivers as from V2.0 can directly address code numbers > 255. C1508 is not effective here. • C1508 is set to 0 after every mains connection.	

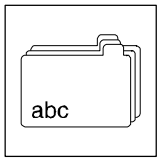
Code		Possible settings			IMPORTANT		
No.	Name	Lenze	Selection		Standardization	Parameter channel	
C1509	LECOM-B station address	3	3	{1} 126	For a unambiguous identification, every bus device must have another station address.		📖 5-5
C1510	Configuration process input data master				Assigns status information or actual values of the controller to the process data input words of the master.		📖 5-10
1	PIW1 (C1517, bit 0 ... bit 15)	1	1	FIF status word 1 (FIF-STAT1)	16 Bit	-	
2	PIW2 (C1517, bit 16 ... bit 31)	3	2	FIF status word 2 (FIF-STAT2)	16 Bit	-	
			3	Output frequency with slip (MCTRL1-NOUT+SLIP)	±24000 ≡ ±480 Hz	C0051 when C0238 = 2	
			4	Output frequency without slip (MCTRL1-NOUT)	±24000 ≡ ±480 Hz	C0050	
			5	Apparent motor current (MCTRL1-IMOT)	2^{14} ≡ 100 % rated controller current	C0054	
			j6	Act. process controller value (PCTRL1-ACT)	±24000 ≡ ±480 Hz	C0051 when C0238=0,1	
			7	Process controller setpoint (PCTRL1-SET1)	±24000 ≡ ±480 Hz		
			8	Process controller output (PCTRL1-OUT)	±24000 ≡ ±480 Hz		
			9	Controller load (MCTRL1-MOUT)	±2^{14} ≡ ±100 % rated motor torque		
			10	DC-bus voltage (MCTRL1-DCVOLT)	1ph: 960 ≡ DC 400 V 3ph: 975 ≡ DC 800 V	C0053	
			11	Ramp function generator input (NSET1-RFG1-IN)	±24000 ≡ ±480 Hz		
			12	Ramp function generator output (NSET1-RFG1-OUT)	±24000 ≡ ±480 Hz		
			13	FIF-OUT.W1	16 Bit or 0 ... 65535		
			14	FIF-OUT.W2	16 Bit or 0 ... 65535		
			15	FIF-OUT.W3	0 ... 65535		
			16	FIF-OUT.W4	0 ... 65535		
C1511	Configuration process output data master				Assigns LECOM process output data of the master to bit control commands or setpoints of the controller.		📖 5-7
1	POW1 (C1517, bit 0 ... bit 15)	1	1	FIF control word 1 (FIF-CTRL1)	16 Bit	-	
2	POW2 (C1517, bit 16 ... bit 31)	3	2	FIF control word 2 (FIF-CTRL2)	16 Bit	-	
			3	Setpoint 1 (NSET1-N1)	±24000 ≡ ±480 Hz	C0046	
			4	Setpoint 2 (NSET1-N2)	±24000 ≡ ±480 Hz	C0044	
			5	Additional setpoint (PCTRL1-NADD)	±24000 ≡ ±480 Hz	C0049	
			j6	Act. process controller value (PCTRL1-ACT)	±24000 ≡ ±480 Hz	C0051 when C0238=1, 2	
			7	Process controller setpoint (PCTRL1-SET)	±24000 ≡ ±480 Hz	C0138	
			8	Reserved			
			9	Torque setpoint or torque limit value (MCTRL1-MSET)	2^{14} ≡ 100 % rated motor torque	C0047	
			10	PWM voltage (MCTRL1-VOLT-ADD)	**Only for special applications. Modifications only when agreed on by Lenze!**		
			11	PWM phase (MCTRL1-PHI-ADD)			
			12	Reserved			
			13	FIF-IN.W1	16 Bit or 0 ... 65535		
			14	FIF-IN.W2	16 Bit or 0 ... 65535		
			15	FIF-IN.W3	0 ... 65535		
			16	FIF-IN.W4	0 ... 65535		



Automation

LECOM-B (RS485)

Code		Possible settings				IMPORTANT		
No.	Name	Lenze	Selection			Standardization	Parameter channel	
C1513	Response monitoring time communication		0	{1 ms}	65534 0 = switched off	When the master does not send a message within the response monitoring time, the action set under C1514 is performed.		
C1514	Action in case of communication error	0	0	No action				
			1	TRIP (fault)				
			2	CINH (controller inhibit)				
			3	QSP (quick stop)				
C1516	LECOM-B baud rate		0	9600 Bit/s				
			1	4800 bit/s				
			2	2400 bit/s				
			3	1200 bit/s				
			4	19200 bit/s				
			5	38400 bit/s				
			6	57600 bit/s				
C1517	LECOM-B process data					32 bit		📖 5-7 📖 5-10
C1520	All words to the master		0	{1}	65535	display only		
1	PIW1							
2	PIW2							
C1521	All words from the master							
1	POW1							
2	POW2							
C1522	All words to the controller							
1	FIF-IN, word 1 ... word 16							
...								
16								
C1523	All words from the controller							
1	FIF-OUT, word 1 ... word 16							
...								
16								
C1530	Diagnostics					always 0		
C1531	Bus states					Output of bus states		
1	Counter 1		Data cycles per seconds			Counters count up to 65535 and then restart at zero.		
2	Counter 2		Total data cycles					



6 Appendix

6.1 Consistent parameter data for PROFIBUS-DP

6.1.1 What does consistency mean?

The use of consistent parameter data ensures the fault-free data exchange between the central processor (CPU) and the PROFIBUS-DP master via the common memory (dual port memory). Consistency is achieved via the corresponding configuration of the PROFIBUS-DP master.

Central processor (CPU)	⇔	**Dual port memory (DPM)**	⇔	**PROFIBUS-DP master**
Read: PROFIBUS waits until reading completed				Waits until data from slave completed Writes only complete data set to DPM Writes only when CPU is not reading.

- Consistent data are all areas with more than 1 word (or 1 byte) consistent data (”module consistency”).
- The consistency is always switched on by accessing any word in the consistent area:
  – Data are exchanged.
  – The consistency is then switched off by a defined switch-off word.
- The switching-off by using the switch-off word is the signal for the read or write enable by the PROFIBUS master.
  – The type of central processor, the type of consistency and the address area determine the word which switches off the consistency.

6.1.2 Why is consistency useful?

When parameter data are exchanged without consistency, data from the CPU may be read faster than they are updated by the PROFIBUS-DP master:

The PROFIBUS master copies data consecutively to the DPM. Since the job byte is always transmitted first, the central processor would immediately start to read data in the DPM, unless consistency is used. With consistency, ”reading data” is faster than ”updating data”.

With consistency, only either ”reading” or ”writing” is possible:

- The PROFIBUS-DP master passes on data only as a complete data set.
- The central processor can access only to completely updated data sets.
- The PROFIBUS-DP master cannot read or write data as long as the central processor accesses consistent data.

6.1.3 How is consistency achieved?

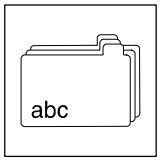
Simply by the suitable configuration of the PROFIBUS-DP master. (📖 3-6)

In doing so, you determine the type of consistency.

Tip!

Working with consistency depends on the type of central processor, the type of consistency and the address area. Please consider:

- Consistency is switched on by any word in the consistent area.
- Consistency must be switched off by a specified switch-off word.



Appendix

6.2 LECOM-A/B protocol

The LECOM-A/B protocol is used to exchange data between Lenze controllers and a host. The LECOM-A/B protocol is based on DIN 66019, ISO 1745 and ANSI X3.28 (category 2.5 and A2, A4). These standards are similar to each other and describe the control mode of a transmission section of a transmission system.

The host (master) communicates with a slave (Lenze controller) via three types of calling:

- RECEIVE (📖 6-7)
- SEND (📖 6-9)
- BROADCAST/MULTICAST (📖 6-10)

6.2.1 General

The units communicate by means of the ASCII code:

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	I	F
0	NUL	SOH	STX	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	jFF	CR	SO	SI
1	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
2	‘ ’	‘!’	‘””’	‘#’	‘$’	‘%’	‘&’	‘’’	‘(’	‘)’	‘*’	‘+’	‘,’	‘-’	‘.’	‘/’
3	‘0’	‘1’	‘2’	‘3’	‘4’	‘5’	‘6’	‘7’	‘8’	‘9’	‘:’	‘;’	‘<’	‘=’	‘>’	‘?’
4	‘@’	‘A’	‘B’	‘C’	‘D’	‘E’	‘F’	‘G’	‘H’	‘I’	‘J’	‘K’	‘L’	‘M’	‘N’	‘O’
5	‘P’	‘Q’	‘R’	‘S’	‘T’	‘U’	‘V’	‘W’	‘X’	‘Y’	‘Z’	‘[’	‘\’	‘]’	‘^’	‘_’
6	‘‘’	‘a’	‘b’	‘c’	‘d’	‘e’	‘f’	‘g’	‘h’	‘i’	‘j’	‘k’	‘l’	‘m’	‘n’	‘o’
7	‘p’	‘q’	‘r’	‘s’	‘t’	‘u’	‘v’	‘w’	‘x’	‘y’	‘z’	‘{’	‘|’	‘}’	‘~’	

Example: ”EOT” = $04_{hex} = 4_{dec}$

Character ”1” = $31_{hex} = 49_{dec}$

Code number (C1, C2)

Standard addressing

The meaning of the code numbers and the assigned parameters can be obtained from the code tables. When transmitting data, the code number are coded as follows:

The following formula is used to determine the two ASCII characters □ (value range: 48_{dec} □ 127_{dec})from the code number (value range: 0 □ 6229):

C1 = INTEGER((REMAINDER(code number/790))/10)+48_{dec}

C2 = REMAINDER(REMAINDER(Code number/790)/10) + INTEGER(Code number/790) x 10 + 48_{dec}

The INTEGER is the digit before the decimal point, the REMAINDER is an integer.

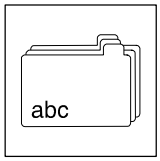
Example: 13/5 = 2 remainder 3
INTEGER(13/5) = 2
REMAINDER(13/5) = 3

Example:
Convert code number 1002 in ASCII code C1 and C2:

$C1_{ASCII}$ = INTEGER((REMAINDER(1002/790))/10) + 48 = INTEGER(212/10) + 48 = 21 + 48 = 69 = 45_{hex} = ”E”$_{ASCII}$

$C2_{ASCII}$ = REMAINDER(REMAINDER(1002/790)/10) + INTEGER(1002/790) x 10 + 48 = REMAINDER(212/10) + 1 x 10 + 48 = 2 + 10 + 48 = 60 = $3C_{hex}$ = ”<”$_{ASCII}$

The code number C1002 is converted into the ASCII string ”E<”, if they are transmitted to the controller by a host.



Addressing via code bank

With previous LECOM-A/B drivers, only code numbers in the range from 0 to 255 could have been addressed, since these drivers used only one byte as code number. To achieve the addressing of the wider code-number range with these drivers, use the code banking.The code-number range 0 ▫ 255 is displayed as a window over the whole code-number range. This is controlled via the codeC0249 (code bank). Code C0249 can always be accessed via number 249, independent of the currently set code bank.

Assignment:

Code bank	Code offset	Code-number range
0	0	0 ... 255
1	250	250 ... 505
2	500	500 ... 755
3	750	750 ... 1005
4	1000	1000 ... 1255
5	1250	1250 ... 1505
6	1500	1500 ... 1755
7	1750	1750 ... 2005
...	...	...
31	7750	7750 ... 8005

Note:
Code banking is only active when the standard addressing is being used. If the selected code numbers are higher than 255, the code-number range increases correspondingly. Only the corresponding code-number offset is selected by means of the code bank.

Example:
Set the code bank INTEGER (1002/250) =4 in C0249 to address the code number 1002. C1002 is then accessed via the code number C02.

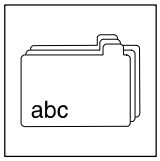
Addressing via input selection

Simple LECOM-A/B drivers, which only use the standard addressing, cannot address subcodes. The input selection C0248 has been developed to offer the possibility of addressing the subcodes. When using the standard addressing, the value entered in C0248 is always considered as the subcode. The code C0248 can always be accessed via number 248, independent of the currently set code bank and the subcode used.

Example:
Enter value 1 in C0248 to address the JOG value 1 in subcode 1. Now subelement 1 is always addressed when accessing C39.

Tip!

After a subelement has been accessed through C0248, C0248 should be reset to 0 to avoid the addressing of a subelement "by accident" when accessing a code.



Appendix

Extended addressing

Another possibility is the direct addressing of parameters by means of expanded addressing.

!	CH1	CH2	CH3	CH4	SC1	SC2

The abbreviations have the following meanings:

!	The ASCII character "!" = $21_{hex} = 33_{dec}$ indicates that the extended addressing is used.
CH1 ... CH4	Code number in hexadecimal code: each character corresponds to a nibble of the code numbers (CH1 is most significant, CH4 the least significant nibble).
SC1, SC2	Subcode number in hexadecimal code: each character corresponds to a nibble of the code number word (SC1 is most significant, SC2 the least significant nibble).

The following characters can be displayed in the ASCII code:

ASCII	0	1	2	3	4	5	6	7	8	9	A	B	C	D	I	F
dec	48	49	50	51	52	53	54	55	56	57	65	66	67	68	69	70
hex	30	31	32	33	34	35	36	37	38	39	41	42	43	44	45	46

A code number range from 0 to 65535 can be addressed by means of these characters. A maximum of 255 subelements (field elements) can be accessed via one subcode number of each code.

Example:
1002 = "!03EA00"

Parameter value (V1 to Vn)

Parameter values can be transmitted in four different formats with the following structures:

- ASCII decimal format (VD)

-	VK1	VK2	VK3	VK4	VK5	VK6	.	NK1	NK2	NK3	NK4

- ASCII hexadecimal format (VH)

H	VH1	VH2	VH3	VH4	VH5	VH6	VH7	VH8

- String format (VS)

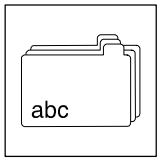
S	VS1	VS2	VS3	VS4	VS5	VS6	...	VS240

- Octet string format for data blocks (VO)

0	VO1	VO2	VO3	VO4	VO5	VO6	...	VO240

The abbreviations have the following meanings:

VK1 to VK6	Integers
.	Decimal point (if required)
NK1 to NK4	Decimal codes (if required)
"H" (48_{hex})	Label [H] for the transmission of parameter values in the ASCII hexadecimal format
VH1 to VH8	1 to 8 hexadecimal characters each [0 to 9; A to F]
"S" (53_{hex})	Label [S] for the transmission of parameter values in the string format
VS1 to VS240	1 to 12 visible ASCII characters each (no control characters)
"O" ($4F_{hex}$)	Label [O] for the transmission of parameter values in the octett string format
VO1 to VO240	Data block in hexadecimal code; each character corresponds to a nibble of the data block



Parameter value in the ASCII decimal format (VD)

The ASCII decimal format (VD) is most often used. The values consist of the following:

1 leading negative sign (if required)
6 digits before the decimal point (VK1 to VK6)
1 decimal point (if required)
4 digits after the decimal point (NK1 to NK4) (if required)

Values from -214748.3648 to 214748.3647 can be displayed.

Tip!

In the ASCII decimal format (VD), the decimal point must not be transmitted if the value does not have digits after the decimal point.

Parameter value in ASCII hexadecimal format (VH)

The LECOM-A/B protocol supports the tranmission of hexadecimal parameter values with a length of:

- 2 characters (byte value)
- 4 characters (wort/integer value)
- 8 characters (double word/long integer)

In the ASCII hexadecimal format, VH1 is the most significant and VH8 the least significant hexadecimal character.

Parameter value in the string format (VS)

By means of the string format (VS) of the protocol it is possible to transmit strings with max. 20 characters in both directions.
The Lenze controller can only send the string parameters (e. g. C200).

Parameter values in the octett string format (VO)

The LECOM-A/B protocol includes the octett string format (VO) with which it is possible to transfer data blocks.
The character sequence corresponds to the filing in the memory (ascending order), i. e. the character transmitted first is the data block nibble with the lowest address. The data structure of the data block corresponds to the Intel-memory format with the following difinition:

BYTE:	1st high nibble
	2nd low nibble
WORD:	1st high BYTE
	2nd low BYTE
DWORD:	1st high WORD
	2nd low WORD

Controller address (AD1, AD2)

One or more bus devices (slaves) can be selected by means of the controller address which is 2bytes (AD1, AD2) long. The LECOM-A/B protocol supports the broadcast telegrams, i.e. a telegram is sent to a group or all other bus devices. For this, controller addresses are reserved (see BROADCAST, page 6-10). Controller addresses have the following structure:

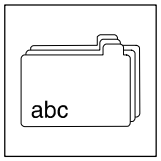
AD1	AD2

The abbreviations have the following meanings:

AD1	ASCII ten-digit of the slave address (0 ▫ 9; 30 ▫ 39_{hex})
AD2	ASCII one-digit of the slave address (0 ▫ 9; 30 ▫ 39_{hex})

Block-check character (BCC)

The block-check character (BCC) is used to store the transmitted data and is generated according to DIN 66219 (chapter 3).



Appendix

Because of the program, the block-check character is generated by a XOR link from the following digits of the SEND telegram:

- it starts with the character directly after the STX control character
- it ends directly after the ETX control character
  – BCC can accept the value 00 ▫ FF_{hex}.

EOT	AD1	AD2	STX	C1	C2	V1	...	Vn	ETX	BCC
				<——— BCC ———>						

or with the expanded addressing:

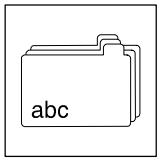
	STX	"!"	CH1	CH2	...	SC2	ETX	BCC
		<——— BCC ———>						

Telegram response

The Lenze controller must return an acknowledgement to the host. The only exception is the broadcast telegram. This telegram does not require an acknowledgement.

The Lenze controller sends two types of acknowledgements:

- Positive acknowledgement (ACK = 06_{hex}), if:
  – no faults occur during the block storage (longitudinal and lateral parity)
  – a valid command (variable address) has been recognized
  – the variable value is within the permissible range
  – the variable value could have been changed
- negative acknowlegdement (NAK = 15_{hex}), if:
  – one of the above listed conditions cannot be met.
- No acknowledgement, if:
  – a broadcast telegram is send
  – the controller address is not correct



6.2.2 RECEIVE

The command RECEIVE is to request parameter values of the Lenze controllers. The code numbers of the requested parameter are transmitted via the RECEIVE telegram using the following structure:

EOT	AD1	AD2	C1	C2	ENQ

The abbreviations have the following meanings:

EOT (04_{hex})	End of the (previous) transmission
AD1, AD2	Logic controller address of the slaves to be addressed
C1, C2	Code number (two ASCII characters) or extended addressing
ENQ (05_{hex})	Station request

Structure and meaning of the code numbers (C1, C2) and the controller address (AD1, AD2) are described in the corresponding paragraphs of the chapter SEND (see page 6-9).

Telegram response

The Lenze controller addressed via a RECEIVE telegram generates one of the following responses:

- The controller could decode the request and is now sending the requested parameter value to the host.

STX	C1	C2	V1	...	Vn	ETX	BCC

- The controller could decode the request, however, a check-sum fault (parity fault) occured during transmission.

STX	C1	C2	?	ETX	BCC

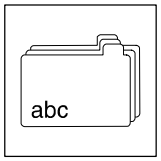
- The controller could not process the request because the requested code number does not exist.

STX	C1	C2	EOT

The abbreviations have the following meanings:

STX (02_{hex})	Start of text
C1, C2	Code number (two ASCII characters) or extended addressing
V1 to Vn	Parameter value (n ASCII characters)
ETX (03_{hex})	End of text
BCC	Block-check character (00 ▫ FF_{hex})
? ($3F_{hex}$)	ASCII character "?"
EOT (04_{hex})	End of the (previous) transmission

Structure and meaning of the block-check (BCC) are described in the corresponding section of the chapter SEND beschrieben. (📖 6-5)



Appendix

Examples for a RECEIVE telegram

Example 1

The current speed setpoint (code number C46) is to be read with the bus address 01 at the controller.

The host sends the following RECEIVE telegram

EOT	0	1	4	6	ENQ

The controller can respond in three different ways:

STX	4	6	3	5	.	4	ETX	BCC

Valid request: The current value of the parameter C46 is 35.4 (Hz)

or

STX	4	6	?	ETX	BCC

Invalid request: A check-sum fault (parity fault) occured during data transmission

or

STX	4	6	EOT

Invalid request: Parameter C46 does not exist in this controller.

Example 2

The current operating status (code number C68) is to be read with the bus address 25 for the controller.
The operating status is bit-coded and transmitted in the hexadecimal format.

The host sends the following RECEIVE telegram

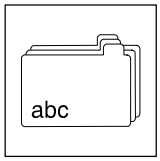
EOT	2	5	6	8	ENQ

The controller's response:

STX	6	8	H	0	9	0	0	ETX	BCC

Valid request: The current value of the parameter C68 is "0900". This means:

TRIP status	not active	
Maximum current	not reached	
Quick stop	not active	
Pulse inhibit status	free	
Display of the direction of rotation		CW rotation
Q_{min} status	not active	
Controller enable	enabled	
Operating fault	did not occur	
Communication error	did not occur	



6.2.3 SEND

The command SEND is to transmit data from the master to the slave. The master then sends a telegram with the following structure:

EOT	AD1	AD2	STX	C1	C2	V1	...	Vn	ETX	BCC

The abbreviations have the following meanings:

EOT (04_{hex})	End of the (previous) transmission
AD1, AD2	Logic controller address of the slaves to be addressed
STX (02_{hex})	Start of text
C1, C2	Code number (two ASCII characters)
V1 to Vn	Parameter valuet (n ASCII characters)
ETX (03_{hex})	End of text
BCC	Block-check character (00 ▫ FF_{hex})

In the text section of the telegram, which is embedded between the control characters STX and ETX, the code number (C1, C2) and the corresponding parameter value (V1 to Vn) are transmitted to the slave.

Example for a SEND telegram

The maximum speed (code number C11) is to be set to the value 95.2 Hz via the bus address 34 at the controller.

The host must send the following SEND telegram:

EOT	3	4	STX	1	1	9	5	.	2	ETX	BCC

The controller can respond with two different acknowledgements:

ACK

The command could not be processed correctly. The current value of the parameter C11 is 95.2 Hz

or

NAK

The request could not been processed correctly.The parameter value was not changed.

6.2.4 BROADCAST / MULTICAST

In a bus network, the command BROADCAST is to address all devices or a group of devices (multicast) at the same time. The structure of the BROADCAST telegram is similar to the structure of the SEND telegram. The only exception is that it does not return an acknowledgement.

The devices can be selected via their controller addresses. The following controller addresses are reserved for a BROADCAST telegram:

Contr. addresses (reserved)	Contr. address of groups	ASCII character	
		AD1	AD2
00	all	”0”	”0”
10	11 to 19	”1”	”0”
20	21 to 29	”2”	”0”
30	31 to 39	”3”	”0”
40	41 to 49	”4”	”0”
50	51 to 59	”5”	”0”
60	61 to 69	”6”	”0”
70	71 to 79	”7”	”0”
80	81 to 89	”8”	”0”
90	91 to 99	”9”	”0”

Example for a BROADCAST telegram

All controllers are to be stopped when setting controller enable (code number C40 = 0).

The host send the following BROADCAST telegram:

EOT	0	0	STX	4	0	0	ETX	BCC

The controllers do not return an acknowledgement.

6.2.5 Monitoring of the slave response

The master monitors the selected slave. The slave must return a response within a defined time.Under the following circumstances the slave does not return a response to the master (time out):

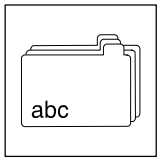
- The controller address could not be recognized
- A fault (e.g. parity fault) had been detected in one or several characters, including the character ”ENQ”
- The transmission path is faulty
- A BROADCAST telegram had been sent
- The hardware does not work properly

If the master does not receive a response within a defined period of time, the transmission is tried again. The number of repetitions is limited.

The monitoring time in the master should be approx. twice as long as the maximum response time.

6.2.6 Transmission faults

After a transmission fault, the master can read C0068 and evaluate the communication error in bit 4 ▫ 7 .

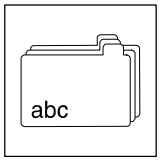


6.3 Attribute table

For writing programs it is necessary to have the data given in the attribute table. The table contains all information required for the parameter communication with the controller.

How to read the attribute table:

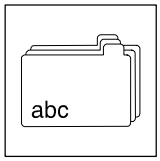
Column		Meaning	Entry	
Code		Name of the Lenze code	Cxxxx	
Index	dec	Index for parameter addressing. The subindex for array variables corresponds to the Lenze subcode number		Only required for control via INTERBUS, PROFIBUS-DP or system bus (CAN).
	hex			
Data	DS	Data structure	I	Single variable (one parameter element only)
			A	Array variable (several parameter elements)
	DA	No. of array elements (subcodes)Anzahl der Arrayelemente (Subcodes)	xx	
	DT	Data type	B8	1 byte bit coded
			B16	2 byte bit coded
			B32	4 byte bit coded
			FIX32	32 bit value with sign; decimal with 4 decimal codes
			I32	4 byte with sign
			U32	4 byte without sign
			VS	ASCII string
	DL	Data length in byte		
	Format	LECOM format	VD	ASCII decimal format
			VH	ASCII hexadecimal format
			VS	String format
			VO	Octett string format for data blocks
Access	LCM-R/W	Access permission for LECOM	Ra	Reading always allowed
			Wa	Writing always allowed
			W	Writing only under condition
	Condition	Condition for writing	CINH	Writing only allowed when the controller is inhibited



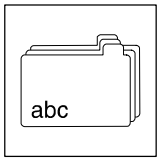
Appendix

6.3.1 Attribute table controller

Code	Index		Data					Access	
	dec	hex	DS	DA	DL	DT	Format	LCM-R/W	Condition
C0001	24574dec	5FFEhex	I	1	4	FIX32	VD	Ra/Wa	
C0002	24573dec	5FFDhex	I	1	4	FIX32	VD	Ra/W	CINH
C0003	24572dec	5FFChex	I	1	4	FIX32	VD	Ra/Wa	
C0004	24571dec	5FFBhex	I	1	4	FIX32	VD	Ra/Wa	
C0005	24570dec	5FFAhex	I	1	4	FIX32	VD	Ra/Wa	
C0007	24568dec	5FF8hex	I	1	4	FIX32	VD	Ra/Wa	
C0008	24567dec	5FF7hex	I	1	4	FIX32	VD	Ra/Wa	
C0009	24566dec	5FF6hex	I	1	4	FIX32	VD	Ra/Wa	
C0010	24565dec	5FF5hex	I	1	4	FIX32	VD	Ra/Wa	
C0011	24564dec	5FF4hex	I	1	4	FIX32	VD	Ra/Wa	
C0012	24563dec	5FF3hex	I	1	4	FIX32	VD	Ra/Wa	
C0013	24562dec	5FF2hex	I	1	4	FIX32	VD	Ra/Wa	
C0014	24561dec	5FF1hex	I	1	4	FIX32	VD	Ra/Wa	
C0015	24560dec	5FF0hex	I	1	4	FIX32	VD	Ra/Wa	
C0016	24559dec	5FEFhex	I	1	4	FIX32	VD	Ra/Wa	
C0017	24558dec	5FEEhex	I	1	4	FIX32	VD	Ra/Wa	
C0018	24557dec	5FEDhex	I	1	4	FIX32	VD	Ra/Wa	
C0019	24556dec	5FEChex	I	1	4	FIX32	VD	Ra/Wa	
C0021	24554dec	5FEAhex	I	1	4	FIX32	VD	Ra/Wa	
C0022	24553dec	5FE9hex	I	1	4	FIX32	VD	Ra/Wa	
C0023	24552dec	5FE8hex	I	1	4	FIX32	VD	Ra/Wa	
C0026	24549dec	5FE5hex	I	1	4	FIX32	VD	Ra/Wa	
C0027	24548dec	5FE4hex	I	1	4	FIX32	VD	Ra/Wa	
C0034	24541dec	5FDDhex	I	1	4	FIX32	VD	Ra/Wa	
C0035	24540dec	5FDChex	I	1	4	FIX32	VD	Ra/Wa	
C0036	24539dec	5FDBhex	I	1	4	FIX32	VD	Ra/Wa	
C0037	24538dec	5FDAhex	I	1	4	FIX32	VD	Ra/Wa	
C0038	24537dec	5FD9hex	I	1	4	FIX32	VD	Ra/Wa	
C0039	24536dec	5FD8hex	I	1	4	FIX32	VD	Ra/Wa	
C0040	24535dec	5FD7hex	I	1	4	FIX32	VD	Ra/Wa	
C0043	24532dec	5FD4hex	I	1	4	FIX32	VD	Ra/Wa	
C0044	24531dec	5FD3hex	I	1	4	FIX32	VD	Ra	
C0046	24529dec	5FD1hex	I	1	4	FIX32	VD	Ra	
C0047	24528dec	5FD0hex	I	1	4	FIX32	VD	Ra	
C0049	24526dec	5FCEhex	I	1	4	FIX32	VD	Ra	
C0050	24525dec	5FCDhex	I	1	4	FIX32	VD	Ra	
C0051	24524dec	5FCChex	I	1	4	FIX32	VD	Ra	
C0052	24523dec	5FCBhex	I	1	4	FIX32	VD	Ra	
C0053	24522dec	5FCAhex	I	1	4	FIX32	VD	Ra	
C0054	24521dec	5FC9hex	I	1	4	FIX32	VD	Ra	
C0056	24519dec	5FC7hex	I	1	4	FIX32	VD	Ra	
C0061	24514dec	5FC2hex	I	1	4	FIX32	VD	Ra	
C0070	24505dec	5FB9hex	I	1	4	FIX32	VD	Ra/Wa	
C0071	24504dec	5FB8hex	I	1	4	FIX32	VD	Ra/Wa	
C0072	24503dec	5FB7hex	I	1	4	FIX32	VD	Ra/Wa	
C0074	24501dec	5FB5hex	I	1	4	FIX32	VD	Ra/Wa	
C0077	24498dec	5FB2hex	I	1	4	FIX32	VD	Ra/Wa	
C0078	24497dec	5FB1hex	I	1	4	FIX32	VD	Ra/Wa	
C0079	24496dec	5FB0hex	I	1	4	FIX32	VD	Ra/Wa	
C0084	24491dec	5FABhex	I	1	4	FIX32	VD	Ra/Wa	
C0087	24488dec	5FA8hex	I	1	4	FIX32	VD	Ra/Wa	
C0088	24487dec	5FA7hex	I	1	4	FIX32	VD	Ra/Wa	
C0089	24486dec	5FA6hex	I	1	4	FIX32	VD	Ra/Wa	
C0090	24485dec	5FA5hex	I	1	4	FIX32	VD	Ra/Wa	
C0091	24484dec	5FA4hex	I	1	4	FIX32	VD	Ra/Wa	
C0092	24483dec	5FA3hex	I	1	4	FIX32	VD	Ra/Wa	
C0093	24482dec	5FA2hex	I	1	4	FIX32	VD	Ra	
C0094	24481dec	5FA1hex	I	1	4	FIX32	VD	Ra	
C0099	24476dec	5F9Chex	I	1	4	FIX32	VD	Ra	
C0105	24470dec	5F96hex	I	1	4	FIX32	VD	Ra/Wa	

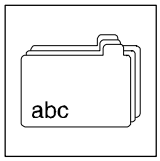


Code	Index		Data					Access	
	dec	hex	DS	DA	DL	DT	Format	LCM-R/W	Condition
C0106	24469dec	5F95hex	I	1	4	FIX32	VD	Ra/Wa	
C0107	24468dec	5F94hex	I	1	4	FIX32	VD	Ra/Wa	
C0108	24467dec	5F93hex	I	1	4	FIX32	VD	Ra/Wa	
C0109	24466dec	5F92hex	I	1	4	FIX32	VD	Ra/Wa	
C0111	24464dec	5F90hex	I	1	4	FIX32	VD	Ra/Wa	
C0114	24461dec	5F8Dhex	I	1	4	FIX32	VD	Ra/Wa	
C0117	24458dec	5F8Ahex	I	1	4	FIX32	VD	Ra/Wa	
C0119	24456dec	5F88hex	I	1	4	FIX32	VD	Ra/Wa	
C0120	24455dec	5F87hex	I	1	4	FIX32	VD	Ra/Wa	
C0125	24450dec	5F82hex	I	1	4	FIX32	VD	Ra/Wa	
C0126	24449dec	5F81hex	I	1	4	FIX32	VD	Ra/Wa	
C0127	24448dec	5F80hex	I	1	4	FIX32	VD	Ra/Wa	
C0135	24440dec	5F78hex	I	1	2	B16	VH	Ra	
C0138	24437dec	5F75hex	I	1	4	FIX32	VD	Ra	
C0139	24436dec	5F74hex	I	1	4	FIX32	VD	Ra	
C0140	24435dec	5F73hex	I	1	4	FIX32	VD	Ra/Wa	
C0141	24434dec	5F72hex	I	1	4	FIX32	VD	Ra/Wa	
C0142	24433dec	5F71hex	I	1	4	FIX32	VD	Ra/Wa	
C0143	24432dec	5F70hex	I	1	4	FIX32	VD	Ra/Wa	
C0144	24431dec	5F6Fhex	I	1	4	FIX32	VD	Ra/Wa	
C0145	24430dec	5F6Ehex	I	1	4	FIX32	VD	Ra/Wa	
C0148	24427dec	5F6Bhex	I	1	4	FIX32	VD	Ra/W	CINH
C0150	24425dec	5F69hex	I	1	2	B16	VH	Ra	
C0151	24424dec	5F68hex	I	1	2	B16	VH	Ra	
C0155	24420dec	5F64hex	I	1	2	B16	VH	Ra	
C0156	24419dec	5F63hex	I	1	4	FIX32	VD	Ra/Wa	
C0161	24414dec	5F5Ehex	I	1	4	FIX32	VD	Ra	
C0162	24413dec	5F5Dhex	I	1	4	FIX32	VD	Ra	
C0163	24412dec	5F5Chex	I	1	4	FIX32	VD	Ra	
C0164	24411dec	5F5Bhex	I	1	4	FIX32	VD	Ra	
C0165	24410dec	5F5Ahex	I	1	4	FIX32	VD	Ra/Wa	
C0168	24407dec	5F57hex	I	1	4	FIX32	VD	Ra	
C0170	24405dec	5F55hex	I	1	4	FIX32	VD	Ra/Wa	
C0171	24404dec	5F54hex	I	1	4	FIX32	VD	Ra/Wa	
C0174	24401dec	5F51hex	I	1	4	FIX32	VD	Ra/W	CINH
C0178	24397dec	5F4Dhex	I	1	4	FIX32	VD	Ra	
C0179	24396dec	5F4Chex	I	1	4	FIX32	VD	Ra	
C0181	24394dec	5F4Ahex	I	1	4	FIX32	VD	Ra/Wa	
C0182	24393dec	5F49hex	I	1	4	FIX32	VD	Ra/Wa	
C0183	24392dec	5F48hex	I	1	4	FIX32	VD	Ra	
C0184	24391dec	5F47hex	I	1	4	FIX32	VD	Ra/Wa	
C0185	24390dec	5F46hex	I	1	4	FIX32	VD	Ra/Wa	
C0196	24379dec	5F3Bhex	I	1	4	FIX32	VD	Ra/Wa	
C0200	24375dec	5F37hex	I	1	14	VS	VS	Ra	
C0201	24374dec	5F36hex	I	1	17	VS	VS	Ra	
C0202	24373dec	5F35hex	I	1	4	FIX32	VD	Ra	
C0220	24355dec	5F23hex	I	1	4	FIX32	VD	Ra/Wa	
C0221	24354dec	5F22hex	I	1	4	FIX32	VD	Ra/Wa	
C0238	24337dec	5F11hex	I	1	4	FIX32	VD	Ra/Wa	
C0239	24336dec	5F10hex	I	1	4	FIX32	VD	Ra/Wa	
C0265	24310dec	5EF6hex	I	1	4	FIX32	VD	Ra/Wa	
C0304	24271dec	5ECFhex	I	1	4	FIX32	VD	Ra/Wa	
C0305	24270dec	5ECEhex	I	1	4	FIX32	VD	Ra/Wa	
C0306	24269dec	5ECDhex	I	1	2	U16	VH	Ra/Wa	
C0307	24268dec	5ECChex	I	1	2	U16	VH	Ra/Wa	
C0308	24267dec	5ECBhex	I	1	4	FIX32	VD	Ra/Wa	
C0309	24266dec	5ECAhex	I	1	4	FIX32	VD	Ra/Wa	
C0350	24225dec	5EA1hex	I	1	4	FIX32	VD	Ra/Wa	
C0351	24224dec	5EA0hex	I	1	4	FIX32	VD	Ra/Wa	
C0352	24223dec	5E9Fhex	I	1	4	FIX32	VD	Ra/Wa	
C0353	24222dec	5E9Ehex	A	3	4	FIX32	VD	Ra/Wa	
C0354	24221dec	5E9Dhex	A	6	4	FIX32	VD	Ra/Wa	



Appendix

Code	Index		Data					Access	
	dec	hex	DS	DA	DL	DT	Format	LCM-R/W	Condition
C0355	24220dec	5E9Chex	A	6	4	FIX32	VD	Ra	
C0356	24219dec	5E9Bhex	A	4	4	FIX32	VD	Ra/Wa	
C0357	24218dec	5E9Ahex	A	3	4	FIX32	VD	Ra/Wa	
C0358	24217dec	5E99hex	I	1	4	FIX32	VD	Ra/Wa	
C0359	24216dec	5E98hex	I	1	4	FIX32	VD	Ra	
C0360	24215dec	5E97hex	I	1	4	FIX32	VD	Ra/Wa	
C0370	24205dec	5E8Dhex	I	1	4	FIX32	VD	Ra/Wa	
C0372	24203dec	5E8Bhex	I	1	4	FIX32	VD	Ra	
C0395	24180dec	5E74hex	I	1	4	B32	VH	Ra	
C0396	24179dec	5E73hex	I	1	4	B32	VH	Ra	
C0410	24165dec	5E65hex	A	25	4	FIX32	VD	Ra/Wa	
C0411	24164dec	5E64hex	I	1	4	FIX32	VD	Ra/Wa	
C0412	24163dec	5E63hex	A	9	4	FIX32	VD	Ra/Wa	
C0413	24162dec	5E62hex	A	2	4	FIX32	VD	Ra/Wa	
C0414	24161dec	5E61hex	A	2	4	FIX32	VD	Ra/Wa	
C0415	24160dec	5E60hex	A	3	4	FIX32	VD	Ra/Wa	
C0416	24159dec	5E5Fhex	I	1	4	FIX32	VD	Ra/Wa	
C0417	24158dec	5E5Ehex	A	16	4	FIX32	VD	Ra/Wa	
C0418	24157dec	5E5Dhex	A	16	4	FIX32	VD	Ra/Wa	
C0419	24156dec	5E5Chex	A	3	4	FIX32	VD	Ra/Wa	
C0420	24155dec	5E5Bhex	I	1	4	FIX32	VD	Ra/Wa	
C0421	24154dec	5E5Ahex	A	10	4	FIX32	VD	Ra/Wa	
C0422	24153dec	5E59hex	I	1	4	FIX32	VD	Ra/Wa	
C0425	24150dec	5E56hex	I	1	4	FIX32	VD	Ra/Wa	
C0426	24149dec	5E55hex	I	1	4	FIX32	VD	Ra/Wa	
C0427	24148dec	5E54hex	I	1	4	FIX32	VD	Ra/Wa	
C0469	24106dec	5E2Ahex	I	1	4	FIX32	VD	Ra/W	CINH
C0500	24075dec	5E0Bhex	I	1	4	FIX32	VD	Ra/Wa	
C0501	24074dec	5E0Ahex	I	1	4	FIX32	VD	Ra/Wa	
C0517	24058dec	5DFAhex	A	10	4	FIX32	VD	Ra/Wa	
C0518	24057dec	5DF9hex	A	250	4	FIX32	VD	Ra/Wa	
C0519	24056dec	5DF8hex	A	250	4	FIX32	VD	Ra	
C0597	23978dec	5DAAhex	I	1	4	FIX32	VD	Ra/Wa	
C0599	23976dec	5DA8hex	I	1	4	FIX32	VD	Ra/Wa	
C0625	23950dec	5D8Ehex	I	1	4	FIX32	VD	Ra/Wa	
C0626	23949dec	5D8Dhex	I	1	4	FIX32	VD	Ra/Wa	
C0627	23948dec	5D8Chex	I	1	4	FIX32	VD	Ra/Wa	
C0628	23947dec	5D8Bhex	I	1	4	FIX32	VD	Ra/Wa	
C0988	23587dec	5C23hex	I	1	4	FIX32	VD	Ra/Wa	

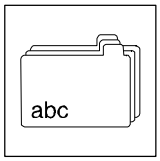


6.3.2 Attribute table function module PROFIBUS-DP

Code	Index		Data					Access	
	dec	hex	DS	DA	DL	DT	Format	LCM-R/W	Condition
C1500	23075	5A23	I	1	14	VS	VS	Ra	
C1501	23074	5A22	I	1	17	VS	VS	Ra	
C1502	23073	5A21	A	4	4	FIX32	VD	Ra	
C1503	23073	5A20	A	4	4	FIX32	VD	Ra	
C1509	23066	5A1A	I	1	4	FIX32	VD	Ra/Wa	
C1510	23065	5A19	A	10	4	FIX32	VD	Ra/Wa	
C1511	23064	5A18	A	10	4	FIX32	VD	Ra/Wa	
C1512	23063	5A17	I	1	4	FIX32	VD	Ra/Wa	
C1513	23062	5A16	I	1	4	FIX32	VD	Ra/Wa	
C1514	23061	5A15	I	1	4	FIX32	VD	Ra/Wa	
C1516	23059	5A13	I	1	4	FIX32	VD	Ra	
C1520	23055	5A0F	A	10	2	U16	VH	Ra	
C1521	23054	5A0E	A	10	2	U16	VH	Ra	
C1522	23053	5A0D	A	16	2	U16	VH	Ra	
C1523	23052	5A0C	A	16	2	U16	VH	Ra	
C1526	23049	5A09	A	3	1	U8	VH	Ra	
C1530	23045	5A05	I	1	4	FIX32	VD	Ra	
C1531	23044	5A04	A	4	4	FIX32	VD	Ra	

6.3.3 Attribute table function module INTERBUS

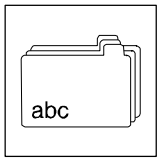
Code	Index		Data					Access	
	dec	hex	DS	DA	DL	DT	Format	LCM-R/W	Condition
C1500	23075	5A23	I	1	14	VS	VS	Ra	
C1501	23074	5A22	I	1	17	VS	VS	Ra	
C1502	23073	5A21	A	4	4	FIX32	VD	Ra	
C1503	23073	5A20	A	4	4	FIX32	VD	Ra	
C1510	23065	5A19	A	6	4	FIX32	VD	Ra/Wa	
C1511	23064	5A18	A	6	4	FIX32	VD	Ra/Wa	
C1512	23063	5A17	I	1	4	FIX32	VD	Ra/Wa	
C1513	23062	5A16	I	1	4	FIX32	VD	Ra/Wa	
C1514	23061	5A15	I	1	4	FIX32	VD	Ra/Wa	
C1515	23060	5A14	I	1	4	FIX32	VD	Ra/Wa	
C1520	23055	5A0F	A	6	2	U16	VH	Ra	
C1521	23054	5A0E	A	6	2	U16	VH	Ra	
C1522	23053	5A0D	A	16	2	U16	VH	Ra	
C1523	23052	5A0C	A	16	2	U16	VH	Ra	
C1525	23050	5A0A	I	1	4	FIX32	VD	Ra	
C1530	23045	5A05	I	1	4	FIX32	VD	Ra	
C1531	23044	5A04	A	4	4	FIX32	VD	Ra	



Appendix

6.3.4 Attribute table function module LECOM-B (RS485)

Code	Index		Data					Access	
	dec	hex	DS	DA	DL	DT	Format	LCM-R/W	Condition
C1500	23075	5A23	I	1	14	VS	VS	Ra	
C1501	23074	5A22	I	1	17	VS	VS	Ra	
C1502	23073	5A21	A	4	4	FIX32	VD	Ra	
C1503	23073	5A20	A	4	4	FIX32	VD	Ra	
C1507	23068	5A1C	I	1	4	FIX32	VD	Ra/Wa	
C1508	23067	5A1B	I	1	4	FIX32	VD	Ra/Wa	
C1509	23066	5A1A	I	1	4	FIX32	VD	Ra/Wa	
C1510	23065	5A19	A	2	4	FIX32	VD	Ra/Wa	
C1511	23064	5A18	A	2	4	FIX32	VD	Ra/Wa	
C1513	23062	5A16	I	1	4	FIX32	VD	Ra/Wa	
C1514	23061	5A15	I	1	4	FIX32	VD	Ra/Wa	
C1516	23059	5A13	I	1	4	FIX32	VD	Ra/Wa	
C1517	23058	5A12	I	1	4	U32	VH	Ra/Wa	
C1520	23055	5A0F	A	2	2	U16	VH	Ra	
C1521	23054	5A0E	A	2	2	U16	VH	Ra	
C1522	23053	5A0D	A	16	2	U16	VH	Ra	
C1523	23052	5A0C	A	16	2	U16	VH	Ra	
C1530	23045	5A05	I	1	4	FIX32	VD	Ra	
C1531	23044	5A04	A	4	4	FIX32	VD	Ra	



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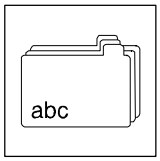

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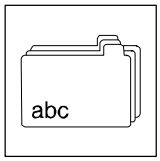

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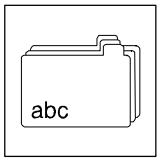

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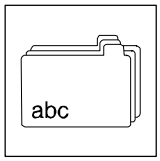

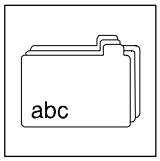

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